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AUTOBODY TECHNOLOGY CURRICULUM

January 1999

Division of Vocational Education
650 West State Street
Boise, Idaho 83720

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ACKNOWLEDGEMENTS

Planning, developing and writing this publication required the coordinated efforts of many people involved in the occupational field of Autobody Technology in the State of Idaho. Appreciation is expressed to the vocational auto body repair instructors, their administrators and the Technical Committee members who provided their assistance to the development of this document.

The Idaho Division of Vocational Education obtained permission from the State of Alabama to use the Alabama Curriculum Standards as a base document in 1984. This revision is based on a Technical Committee review of the tasks in the occupation and a subsequent development of performance objectives by a writing team. The committee reviewed a 1988 task list from the state of Florida and identified those tasks which were indicative of the occupations in Idaho. A curriculum development committee comprised of instructors in the field met to prepare this document.

The Technical Committee members were: Harry Layman, Harry's Body Repair, Pocatello; Gerald Kelly, State Farm Insurance, Boise; Bob Jackson, Bob Jackson's Body Repair, Lewiston; Mike Williams, Bonanza Motors, Burley; Keith Applegate, Bob Rice Ford, Boise; Dick Novack, State Farm Insurance, Boise. The committee responsible for developing the Curriculum Guide included the following instructors: Bob Schmidt, LCSC; Gerri Lunt, Nampa High; Juel Mickelson, Boise Career Education; Charlie Parke, BSU; Arvel McBride, CSI; Clive Grimmett, NIC; and Don Geisler, ISU. The Curriculum writer was Don Siplon. The Division sincerely appreciates the time and effort devoted by these people in completing this manual.

Don Eshelby
Director of Program Services

Sho Ueda
Trades, Industrial and Technical Supervisor

I N T R O D U C T I O N

The Idaho Vocational Program Curriculum Project was a cooperative effort among secondary and postsecondary instructors and administrators to develop competency-based program standards for curriculum content.

The development of this program curriculum has involved vocational-technical instructors and administrators and representatives from business and industry. Prior to the development of the Program Curriculum Guide, a statewide Technical Committee was established following the requirements of the Carl D. Perkins Vocational Education Act. The committee prepared a report listing competencies required in the industry. This report was the document used by the writing committee in preparing the state guide.

The original publication selected for committee review in 1984 was the Alabama Automotive Body Repair Standards. Those standards were developed in Alabama by using the Catalog of Performance Objectives, Criterion-Referenced Measures, and Performance Guides for Auto Body Repair compiled by the State of Florida Department of Vocational-Technical Education for the Vocational-Technical Education Consortium of States (V-TECS). V-TECS is a multi-state organization committed to curriculum research in specific occupational areas. Alabama is one of the original members of V-TECS and has taken an active part in the development of V-TECS catalogs. Florida developed a task list from these standards in 1988. The 1988 document was rewritten using the Technical Committee update process for use in Idaho schools.

The content of the Idaho document was directed toward the occupation of automotive body repair--not toward a specific instructional program offered by any single vocational-technical institution in the State. The benefits to students and institutions derived from the development of this program curriculum should be considerable. Articulation of students from secondary to postsecondary programs will be aided through a single set of standards. Local evaluation of programs and curricula can be accomplished using the standards as an objective measure. Institutions will be able to utilize the curriculum standards in a flexible manner to assure that the vocational programs meet the needs of local business and industry.

STATE OF IDAHO VOCATIONAL CURRICULUM GUIDE

The Idaho Vocational Program Curriculum Guide is an effort of secondary and postsecondary vocational-technical agencies to develop curriculum standards which are common to all autobody programs in the state. These standards should be of tremendous assistance to vocational teachers in colleges/institutions and secondary vocational schools throughout Idaho.

There are many tasks identified with an AA status. These tasks are considered Alternative or Advanced tasks which may be taught after the student has mastered the Basic Core and High Priority status tasks. The AA tasks are not considered essential to entry into the profession. They may be added to the primary curriculum content, depending on the local needs as determined by the advisory committee and other factors in each community.

A student competency profile has been developed from the tasks identified by the Technical Committee. The profile will be the primary device to document student achievement in the programs in Idaho. It will also serve as a required document in the articulation agreements to be developed between postsecondary vocational schools and required high school programs. These profiles will be available from the Curriculum Dissemination Center.

TASK PROFILE

CURRICULUM FRAMEWORK **PROGRAM AREA: Trade & Industrial**

IDAHO DIVISION OF VOCATIONAL EDUCATION **REVISION DATE: January 1999**

PROGRAM TITLE: Autobody Technology

IDAHO CODE NUMBER: 6031 **CIP #: 47.0603**

I. MAJOR CONCEPTS/CONTENT: The purpose of this program is to prepare students for employment as automobile body repairers (807.391-010), automotive painters (845.381-014), automobile body repairer helpers (807.687-010), and automotive painter helpers (845.684-014), or to provide supplemental training for persons previously or currently employed in these occupations.

The content includes, but is not limited to, communication skills, leadership skills, human relations and employability skills, safe and efficient work practices, basic trade skills, refinishing skills, sheet metal repair skills, frame and unibody squaring and aligning, use of fillers, paint systems and undercoats, related welding skills, related mechanical skills, trim-hardware maintenance, glass servicing, and other miscellaneous repairs.

II. LABORATORY ACTIVITIES: Shop or laboratory activities are an integral part of this program and provide instruction in, but are not limited to, use of hand and power tools, panel repairs, use of spray equipment, use of frame and alignment equipment, application of body fillers, paint systems, use of shop materials, glass replacement, and the use of MIG, oxyacetylene, and plastic welders.

III. SPECIAL NOTE: The Vocational Industrial Clubs of America, Inc., is an appropriate vocational student organization for providing communications, leadership, human relations, and employability training experiences and for reinforcing specific vocational skills. When provided, these activities are considered an integral part of this instructional program.

The cooperative method of instruction may be utilized for this program. Whenever the cooperative method is offered, the following is required for each student: a training plan, signed by the student, teacher and employer which includes instructional objectives and a list of on-the-job and in-school learning experiences; and a work station which reflects equipment, skills and tasks relevant to the

occupation the student has chosen as a career goal. The student must receive compensation for work performed.

The particular outcomes and student performance standards which the handicapped student must master to earn credit must be specified in the student's individual educational plan (IEP). Additional credits may be earned when outcomes and standards are mastered in accordance with the requirements indicated in subsequent IEP's. The job title for which the student is being trained must be designated in the IEP.

The typical length of this program for the average achieving postsecondary student is 1800 contact hours (2160 clock hours) The recommended length for secondary programs is 900 hours with multi-period blocks of instruction provided to accomplish a major portion of the listed competencies.

IV. INTENDED OUTCOMES: After successfully completing this program, the individual will be able to:

01. Demonstrate SKILLSUSA leadership and employability skills.
02. Demonstrate shop and occupational safety skills.
03. Demonstrate proper use of tools and equipment.
04. Demonstrate identification of automotive bodies and frames.
05. Demonstrate management and inventory of disassembled parts.
06. Perform cutting and welding operations.
07. Perform basic panel repair.
08. Perform panel replacement.
09. Perform body, frame, and wheel alignment.
10. Inspect, remove and replace suspension systems.
11. Inspect, test, remove, and replace electrical components.
12. Inspect, remove, and replace align trim accessories and hardware.
13. Perform thermoplastic and fiberglass repair.
14. Perform glass replacement.
15. Demonstrate painting and refinishing procedure.
16. Perform estimating procedures.
17. Demonstrate detailing and preparation for delivery.
18. Demonstrate miscellaneous techniques and services.

AA = Advanced Skills

BC = Basic Core

HP = High Priority

TASK LISTING

STUDENT PERFORMANCE STANDARDS **EFFECTIVE DATE: January 1999**

PROGRAM AREA: Trade & Industrial **SECONDARY**_____
PROGRAM TITLE: Autobody Technology **POSTSECONDARY**_____

01.0 SKILLSUSA AND EMPLOYABILITY SKILLS - The student will be able to:

01.01 Describe the SKILLSUSA purpose, motto, pledge, and symbols.
01.02 Identify and use the principles of parliamentary procedure.
01.03 Identify and demonstrate the principles of public speaking.
01.04 Identify the ingredients of good leadership.
01.05 Identify employment opportunities.
01.06 Apply employment-seeking skills.
01.07 Interpret employment capabilities.
01.08 Demonstrate appropriate work behavior.
01.09 Maintain a business like image.
01.10 Maintain working relationships with others.
01.11 Adapt to change.
01.12 Demonstrate knowledge of business.

02.0 SAFETY - The student will be able to:

02.01 Apply shop safety rules and procedures.
02.02 Apply personal safety rules procedures.
02.03 Apply fire safety rules and procedures.

03.0 TOOLS AND EQUIPMENT - The student will be able to:

03.01 Identify, choose, use and care for body repair hand tools.
03.02 Identify and use of power tools and equipment.
03.03 Identify and care for refinishing equipment.

04.0 IDENTIFICATION OF AUTOMOTIVE BODIES AND FRAMES - The student will be able to:

04.01 Identify types of frames.
04.02 Identify body parts and their means of attachment.

05.0 MANAGEMENT AND INVENTORY OF DISASSEMBLED PARTS - The student will be able to:

05.01 Manage, inventory, and store disassembled parts.

06.0 CUTTING AND WELDING - The student will be able to:

06.01 Set up an oxyacetylene station.
06.02 Layout and burn straight cuts in mild steel.
06.03 Light and adjust a welding torch.
06.04 Carry a puddle without filler rod (flat position).
06.05 Carry a puddle with filler rod on mild steel (flat position).
06.06 Construct a butt joint weld (all positions).
06.07 Construct a lap joint weld (all positions).
06.08 Set up and adjust a gas metal arc welding (GMAW) station.
06.09 Weld a straight bead pattern on mild and high strength steel (flat position).
06.10 Weld a straight bead pattern on aluminum (flat position).
06.11 Construct a butt joint weld (all positions).
06.12 Construct a lap joint weld (all positions).
06.13 Construct a plug weld.
06.14 Spot weld components.

07.0 BASIC PANEL REPAIR - The student will be able to:

07.01 Rough out and align steel panels.
07.02 Shrink stretched areas on steel panels.
07.03 Finish metal panels.
07.04 Fill and finish depressed area.
07.05 Repair rusted areas.

08.0 PANEL REPLACEMENT - The student will be able to:

08.01 Remove and replace a bolt-on panel.
08.02 Remove and replace a weld-on panel.
08.03 Remove, replace, and align a door.
08.04 Remove, replace, and align hood and deck panels.
08.05 Remove, align, and replace a unitized weld-on panel.

09.0 BODY AND FRAME ALIGNMENT - The student will be able to:

09.01 Determine conventional body shell and frame alignment.
09.02 Align conventional body shell and frame.
09.03 Repair frame horns and cross members.
09.04 Determine unitized body shell alignment.
09.05 Align a unitized body shell.

10.0 STEERING AND SUSPENSION - The student will be able to:

10.01 Inspect steering gear and linkage.
10.02 Adjust steering sector (manual and power).
10.03 Remove and replace steering components.
10.04 Replace rack and pinion steering assembly.
10.05 Align front suspension, power train and steering components.
10.06 Align rear suspension and power train.
10.07 Remove and replace steering wheel and mast jacket.
10.08 Repair tilt and/or telescopic steering wheel column.
10.09 Inspect, remove, and replace dual control arm suspension system.
10.10 Inspect, remove, and replace McPherson strut suspension assembly.

11.0 ELECTRICAL SYSTEMS - The student will be able to:

11.01 Perform battery service(s).
11.02 Test, remove, and replace a switch.
11.03 Test, remove, and replace a fuse.
11.04 Test, remove, and replace circuit breaker.
11.05 Remove and replace a wiring harness.
11.06 Remove and replace a lamp socket.
11.07 Perform an operational test of lighting circuits.
11.08 Remove, replace, and adjust headlights.
11.09 Test, remove and replace horn circuit, relay, and horn assembly.
11.10 Test an electric motor.
11.11 Remove and replace a power window motor.
11.12 Remove and replace power seat controls.
11.13 Remove and replace a power seat motor.
11.14 Remove and replace a power antenna assembly.
11.15 Remove and replace an antenna.

12.0 TRIM, ACCESSORIES AND HARDWARE - The student will be able to:

12.01 Identify fasteners.
12.02 Remove, replace and align a bumper.
12.03 Remove and replace energy absorbers.
12.04 Remove and replace a grille.
12.05 Remove and replace a padded dashboard.
12.06 Inspect, remove and replace seat and shoulder belts.
12.07 Remove and replace trim panels.
12.08 Remove and replace moldings.
12.09 Install weatherstripping.
12.10 Remove, replace, and align door locks and mating parts.
12.11 Remove, replace, and align a trunk lock and mating parts.
12.12 Remove, replace, and align a hood latch and mating parts.
12.13 Remove, replace, and adjust window regulators.
12.14 Remove and replace seat tracks.
12.15 Detach and re-glue a vinyl top section.

13.0 THERMOPLASTIC AND FIBERGLASS REPAIR - The student will be able to:

13.01 Restore or replace a fiberglass panel.
13.02 Demonstrate proper airless welding techniques.
13.03 Prepare, chemically bond, and finish thermoplastic components.
13.04 Correct or repair distortion in a plastic component.

14.0 GLASS REPLACEMENT - The student will be able to:

14.01 Remove and replace sealed type stationary glass.
14.02 Remove and replace gasket type stationary glass.
14.03 Install a windshield-mounted rearview mirror.
14.04 Remove and replace regulator-controlled movable glass.
14.05 Remove and replace pivot glass and pivot assembly.
14.06 Remove and replace sliding glass.
14.07 Locate and seal leaks around a windshield or rear window.

15.0 PAINTING AND REFINISHING - The student will be able to:

15.01 Clean surfaces for primer, sealer, and undercoating.
15.02 Sand metal surfaces for primer, sealer, and undercoating.
15.03 Condition bare metal for primer, sealer, and undercoating.
15.04 Mask sections and parts.
15.05 Apply undercoats.
15.06 Match and apply finish coats.
15.07 Determine materials for a paint job.
15.08 Clean, compound and polish painted surfaces.
15.09 Prepare a plastic component for refinishing.
15.10 Refinish plastic components.
15.11 Remove and apply decals and striping.
15.12 Refinish vinyl surfaces (tops, dashes, and interior components).

16.0 ESTIMATING - The student will be able to:

16.01 Interpret a cost estimate for a paint job.
16.02 Complete a parts and materials order form.

17.0 DETAILING AND PREPARATION FOR DELIVERY - The student will be able to:

17.01 Perform interior detailing.
17.02 Perform exterior clean-up.
17.03 Perform final inspection for delivery.

18.0 MISCELLANEOUS TECHNIQUES AND SERVICES - The student will be able to:

18.01 Identify, inspect, pressure test, and restore the cooling system.
18.02 Identify, service, purge, test, repair, and charge an automotive air Conditioning system.
18.03 Remove and install an automobile engine and drive train in a safe and efficient manner.

IDAHO CURRICULUM STANDARDS FOR AUTOBODY TECHNOLOGY

MODULE I

SKILLSUSA AND EMPLOYABILITY SKILLS

MODULE I - SkillsUSA and Employability Skills

01.1 TASK: Describe the SkillsUSA purpose, motto, pledge, and symbols

PERFORMANCE OBJECTIVE: Given instruction in the purposes, motto, pledge, creed, colors, and shape of the symbol of SkillsUSA, describe SkillsUSA purposes, write the SkillsUSA motto, recite and SkillsUSA pledge, and identify the SkillsUSA creed, symbols, and colors.

ENABLING OBJECTIVES:
1. Name five purposes of the SkillsUSA organization.
2. Write the SkillsUSA motto.
3. Recite the SkillsUSA pledge.
4. Explain the meaning of the SkillsUSA creed.
5. Identify the symbols of the SkillsUSA emblem and explain their meaning.
6. Identify the SkillsUSA colors and tell what they represent.

01.2 TASK: Identify and use the principles of parliamentary procedure.

PERFORMANCE OBJECTIVE: Given instruction in the principles of parliamentary procedure, match types of motions with their purposes and list characteristics of motions used in conducting a meeting.

ENABLING OBJECTIVES:
1. List two principles of parliamentary procedure.
2. Match types of motions with their definitions.
3. Write the order of business for a meeting.
4. Identify the characteristics of the kinds of motions used in conducting a meeting.
5. Demonstrate correct parliamentary procedure.

01.3 TASK: Identify and demonstrate the principles of public speaking

PERFORMANCE OBJECTIVE: Given instruction in the principles of public speaking, list the purposes of a speech, describe the characteristics of a speech, outline a speech, and write and deliver a five-minute speech.

ENABLING OBJECTIVES:

1. List three purposes for making a speech.
2. Describe the parts of a speech.
3. Outline a speech.
4. Write and deliver a five minute speech.

01.4 TASK: Identify the ingredients of good leadership.

PERFORMANCE OBJECTIVE: Given instruction in the characteristics of good leadership and leadership qualities, the Personality Self-Rating Scale, and peer discussion, name the characteristics of a good leader, identify desirable leadership qualities, and demonstrate an ability to lead.

ENABLING OBJECTIVES:
1. Write a definition of leadership.
2. Name five characteristics of a good leader.
3. Describe four steps to becoming a good leader.
4. Identify your leadership qualities by taking the Personality Self-rating Scale.
5. Develop a leadership profile with classmates.
6. Complete an assigned leadership role.

01.5 TASK: Identify employment opportunities.

PERFORMANCE OBJECTIVE: Given the information resources of a library, obtain and compile the information needed to seek a job.

ENABLING OBJECTIVES:
1. Identify the requirements for a job.
2. Investigate educational opportunities.
3. Investigate occupational opportunities.
4. Locate resources for finding employment.
5. Confer with prospective employers.
6. Identify job trends.

01.6 TASK: Apply employment-seeking skills.

PERFORMANCE OBJECTIVE: Given appropriate information, locate a job opportunity, prepare and take an interview for it, complete the required tests, forms and applications, and evaluate a response to the job opportunity.

ENABLING OBJECTIVES:
1. Locate a job opening.
2. Complete a resume.
3. Prepare for an interview.
4. Participate in an interview.
5. Complete tests required.
6. Complete forms required.
7. Complete an application letter.
8. Complete a follow-up letter.
9. Complete an acceptance letter.
10. Evaluate a job offer.
11. Evaluate a job rejection.

01.7 TASK: Interpret employment capabilities

PERFORMANCE OBJECTIVE: Given the assignment to explain how your capabilities make you employable, demonstrate how to match skills and experience to a job being sought.

ENABLING OBJECTIVES:
1. Match a personal interest to the job area.
2. Match personal aptitudes to the job area.
3. Verify personal abilities.
4. Identify a personal immediate work goal.
5. Develop a career plan.

01.8 TASK: Demonstrate appropriate work behavior

PERFORMANCE OBJECTIVE: Given the responsibility of an employee in a new job, demonstrate knowledge of appropriate behavior in the work place.

ENABLING OBJECTIVES:
1. Exhibit dependability.
2. Demonstrate punctuality.
3. Follow rules and regulations.
4. Explain the consequences of dishonesty.
5. Complete assignments accurately and on time.
6. Control emotions.

7. Take responsibility for decisions and actions.
8. Take pride in the work and be a loyal worker.
9. Learn to handle pressures and tensions.
10. Demonstrate ability to set priorities.
11. Demonstrate problem-solving skills.

01.9 TASK: Maintain a business-like image

PERFORMANCE OBJECTIVE: Given a responsibility to perform the duties of a new job, with a new employer, demonstrate a knowledge of the actions and behaviors which will project a business-like image.

ENABLING OBJECTIVES:
1. Participate in the institution's orientation.
2. Demonstrate knowledge of a company's products/services.
3. Demonstrate procedures and assist others when necessary.
4. Recognize problems and work toward their solution.
5. Minimize the occurrence of problems.
6. Channel emotional reactions in positive ways.

01.10 TASK: Maintain working relationships with others

PERFORMANCE OBJECTIVE: Given the responsibility to perform the duties of a new job, with a new employer, demonstrate knowledge of how to successfully work with others.

ENABLING OBJECTIVES:
1. Work productively with others.
2. Show empathy, respect, and support for others.
3. Demonstrate procedures and assist others when necessary.
4. Recognize problems and work toward their solution.
5. Minimize the occurrence of problems.
6. Channel emotional reactions in positive ways.

01.11 TASK: Adapt to change

PERFORMANCE OBJECTIVE: Given the responsibility to perform the duties of a new job, with a new employer, demonstrate knowledge of how to adapt to change.

ENABLING OBJECTIVES:
1. Recognize the need to change.
2. Demonstrate a willingness to learn.
3. Demonstrate flexibility.
4. Participate in continuing education.
5. Seek challenge in the work place.
6. Adjust goals and plans when necessary.

01.12 TASK: Demonstrate a knowledge of business

PERFORMANCE OBJECTIVE: Given the responsibility to perform the duties of a new job, with a new employer, demonstrate knowledge of the role of that business, its employees, and the free enterprise system.

ENABLING OBJECTIVES:
1. Explain the role of business in the enterprise system.
2. Identify the responsibilities of employees.
3. Identify the responsibilities of managers and employers.
4. Discuss the opportunities for business ownership or management.
5. Describe the planning required to start a business.
6. Discuss the importance of business meetings.

IDAHO CURRICULUM STANDARDS FOR AUTOBODY TECHNOLOGY

MODULE II

SAFETY

*** CAUTION ***
All students must take Right to Know Law Course

02.1 TASK: Apply shop safety rules and procedures

PERFORMANCE OBJECTIVE: Given examples of repair jobs and shop situations, apply shop safety rules and procedures by identifying safe and unsafe shop practices.

ENABLING OBJECTIVES:

1. Identify common hazards in the repair shop, including (a) improper use of tools, (b) unguarded machinery, (c) tripping and falling, (d) excessive exposure to exhaust gases, parts, cleaners, paints, and dust, (e) electrical hazards, and (f) improper lifting.
2. Identify and explain warning signs posted in the shop area.
3. Explain the importance of good housekeeping in the repair shop.
4. Explain the importance of storing materials in a secure manner.
5. Explain safety rules and procedures for operating hydraulic vehicle lifts, jacks and chains, including safety stands.
6. Identify and explain potential hazards associated with handling and disposing of (a) asbestos, (b) carbon monoxide, (c) solvents, (d) paints and thinners, (e) dust, (f) noise, (g) hydrogen gas, and (h) catalysts.
7. Explain safety rules and procedures for painting and refinishing.
8. Explain safety rules and procedures for using compressed air equipment.
9. Explain safety rules for welding, cutting, and brazing.
10. Inspect the body repair shop for conformity with safety rules and procedures.
11. Explain Right To Know Law.
12. Explain Material Safety Data Act.

02.2 TASK: Apply personal safety rules procedures

PERFORMANCE OBJECTIVE: Given examples of repair jobs and shop situations, apply personal safety rules and procedures by identifying safe and unsafe practices.

ENABLING OBJECTIVES:

1. Identify types of personal safety equipment and explain their applications.
2. Identify types of repair work that require eye protection.
3. Identify types of repair work that require hearing protection.
4. Identify types of protective clothing and shoes and describe the conditions which require their use.
5. Identify types of repair work that require respirators and shields.
6. Explain regulations and procedures pertaining to sanitation in shop and restroom areas.
7. Explain personal safety rules and procedures for welding and cutting.
8. Explain the methods for cleaning and storing personal safety equipment.

02.3 TASK: Apply fire safety rules and procedures

PERFORMANCE OBJECTIVE: Given examples of types of fire, fire extinguishers, and shop situations, apply fire safety rules and procedures by identifying safe and unsafe practices.

ENABLING OBJECTIVES:

1. Identify and explain the applications for (a) foam, (b) carbon dioxide, (c) soda acid, (d) pump tank, (e) gas cartridge, (f) dry chemical, and (g) multipurpose dry chemical fire extinguishers.
2. Describe the procedures for operating selected fire extinguishers.
3. Identify the common causes of fire in repair shops and common methods for avoiding or preventing fires.
4. Inspect the repair shop for conformity with fire safety rules and procedures.
5. Describe the shop's fire and emergency evacuation route(s).

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MODULE III

TOOLS AND EQUIPMENT

MODULE III - Tools and Equipment

03.1 TASK: Identification, choice, use, and care of body repair hand tools

PERFORMANCE OBJECTIVE: Given a full assortment of body repair hand tools, technical specifications, job orders, and the necessary materials, identify, choose, safely use, and properly care for the appropriate tool(s) for each job described.

ENABLING OBJECTIVES:

1. Identify the basic body straightening tools.
2. Identify the basic body filing tools.
3. List body specialty tools and their purpose.
4. Describe the types of eye protection equipment.
5. Describe the uses of a bumping hammer.
6. Demonstrate the proper technique when using a body hammer.
7. Describe the uses of dolly blocks.
8. Describe the uses of body spoons.
9. Describe the difference between the teeth of a body file and those of a standard file.
10. Demonstrate the proper use and care of all other body repair tools.
11. Explain the necessary safety precautions to be observed when using body repair hand tools.

03.2 TASK: Identification and use of power tools and equipment

PERFORMANCE OBJECTIVE: Given a shop containing all the power tools and equipment normally used in auto body repair work, technical specifications, safety equipment, job orders, and the necessary materials, identify and properly use the appropriate tools for each job described.

ENABLING OBJECTIVES:

1. Identify hand operated power tools used in auto body repair.
2. Identify the types of power equipment used in auto body repair.
3. Match a set of tasks to the power tools needed to accomplish them.
4. Operate a portable power sander or grinder.
5. Operate a hydraulic jack.
6. Operate a portable drill.
7. Operate a pneumatic air hammer.

8. Operate a heat gun.
9. Operate a bench grinder.
10. Operate a drill press.
11. Operate a MIG welder.
12. Operate a service jack.
13. Operate a front end lift.
14. Demonstrate proper use of safety stands.
15. Operate a frame bench.
16. Operate all other power tools and equipment.
17. Explain the necessary safety precautions for each item.

03.3 TASK: Identification and care of refinishing equipment

PERFORMANCE OBJECTIVE: Given a shop with a full assortment of refinishing equipment, technical specifications, safety equipment, and the necessary tools, equipment and materials, identify, properly clean, and care for each item of refinishing equipment.

ENABLING OBJECTIVES:
1. Identify each item of refinishing equipment.
2. Describe the general safety rules for all painting operations.
3. Clean a paint gun.
4. Clean and maintain a spray booth.
5. Drain an air regulator (transformer).
6. Drain and service an air compressor.
7. Explain the necessary safety precautions for each item.

IDAHO CURRICULUM STANDARDS FOR AUTOBODY TECHNOLOGY

MODULE IV

IDENTIFICATION OF AUTOMOTIVE BODIES AND FRAMES

MODULE IV - Identification of Automotive Bodies and Frames

*** CAUTION ***

- Be certain to disconnect the battery before working on any vehicle.
- Care must be taken when removing the following components:

a. Gas shocks	**d. Energy absorbers**
b. Low MPH collision bumpers	**e. Computer adjusted suspension**
c. Computerized Modules	**f. Air bags**

04.1 TASK: Identify types of frames

PERFORMANCE OBJECTIVE: Given a drawing of a conventional frame vehicle, a unitized construction vehicle, and a list of terms, correctly identify the types of frames and components of each.

ENABLING OBJECTIVES:

1. Match terms associated with conventional and unitized construction to a list of definitions.
2. Identify the types of frames when given a drawing illustrating each type.
3. Identify the components of frames on an illustration.

04.2 TASK: Identify body parts and their means of attachment

PERFORMANCE OBJECTIVE: Given a drawing of an auto body with its parts outlined, identify the location of each part and describe how it is attached.

ENABLING OBJECTIVES:

1. Identify two types of body panels.
2. Identify the sections of a floor panel.
3. Identify the wheel house panel and explain its use.
4. Identify the panels of the front cowl.
5. Describe how inner body panels are fastened together.
6. Identify the areas where quarter panels join body panels.
7. Identify the components of the center post and roof rail construction.
8. Identify the basic panels and component parts which make up the front end assembly.
9. Identify the sections of a door.
10. Match body parts with their location on the drawing.

MODULE V

MANAGEMENT AND INVENTORY OF DISASSEMBLED PARTS

MODULE V - Management and Inventory of Disassembled Parts

05.1 TASK: Manage, inventory, and store disassembled parts

PERFORMANCE OBJECTIVE: Given the disassembled parts of a damaged vehicle, parts nomenclature lists, schematic charts, technical manuals, tagging materials, and the necessary space and equipment, set up a housekeeping process to identify, mark, inventory, store, and/or mark for replacement, if necessary, the components of such vehicle during its repair and reassembly.

ENABLING OBJECTIVES:

1. List the parts which compose the mechanical components of an automobile.
2. Describe a system which may be used for marking and identifying parts.
3. Mark and store a set of disassembled parts in proper sequence for correct reassembly.
4. Describe the handling precautions which should be taken with parts subject to oxidation.
5. Explain the necessary safety precautions.

IDAHO CURRICULUM STANDARDS FOR AUTOBODY TECHNOLOGY

MODULE VI

CUTTING AND WELDING

MODULE VI - Cutting and Welding

*** CAUTION ***
Under no circumstances is any BRAZING to be performed in repair of automobile body components and structural parts.

06.1 TASK: Set up an oxyacetylene station

PERFORMANCE OBJECTIVE: Given an oxyacetylene torch with the tip, regulators, hoses, check valves, cylinder wrenches, oxygen and acetylene cylinders, portable cart, a workbench with welding fixture, and the necessary tools and materials, set up an oxyacetylene station. The oxygen and fuel cylinders must be fastened securely. The gauges, hoses, and torch must be securely attached in their specified locations and must not leak. Adjustment of regulators must be in accordance with manufacturer's specifications for specified weld and type of metal.

ENABLING OBJECTIVES:

1. Explain the necessary safety precautions.
2. Define oxy-acetylene terms.
3. Identify oxy-acetylene symbols and notations.
4. Explain oxy-acetylene safety rules concerning the ventilation and fireproofing of an oxy-acetylene station.
5. Identify oxygen and acetylene cylinders.
6. Explain the safety rules for storing and transporting cylinders.
7. Describe the procedure for cleaning cylinder valves.
8. Identify oxygen and acetylene regulators.
9. Explain the function and operation of oxy-acetylene regulators.
10. Demonstrate the use of cylinder wrenches.
11. Identify oxygen and acetylene hoses.
12. Describe hose cleaning procedures.
13. Describe the procedure for attaching the oxy-acetylene hose and torch assembly to the oxygen and acetylene cylinders.
14. Explain the methods for detecting and repairing leaks.
15. Set up an oxy-acetylene welding station to manufacturer's specifications.

06.2 TASK: Layout and burn straight cuts in mild steel

PERFORMANCE OBJECTIVE: Given an oxyacetylene station, cutting specifications, mild steel, an assortment of tips, personal safety equipment, and the necessary tools and materials, light and adjust the cutting torch to produce a neutral, an oxidizing, and a carburizing flame. Each flame must have a distinct appearance and must meet color and size specifications. Layout and burn straight cuts in mild steel. The panels must maintain conformity throughout the length of the cuts and have no underside slag.

ENABLING OBJECTIVES:

1. Explain the necessary safety precautions.
2. Demonstrate how to read a rule.
3. Solve problems involving addition and subtraction of whole numbers.
4. Solve problems involving addition and subtraction of fractions.
5. Demonstrate the use of layout instruments.
6. Describe the procedure for burning straight cuts in sheet metal
7. Identify cutting tips used for mild steel.
8. Describe the procedure for burning straight cuts in sheet metal.
9. Describe the procedure for gas cutting mild steel channel and angle iron.
10. Layout and burn straight cuts in mild steel.

06.3 TASK: Light and adjust a welding torch

PERFORMANCE OBJECTIVE: Given an oxyacetylene station, an assortment of tips, personal safety equipment, and the necessary tools and materials, light and adjust the welding torch to produce a neutral, an oxidizing, and a carburizing flame. Each flame must have a distinct appearance and must meet color and size specifications.

ENABLING OBJECTIVES:

1. Explain the necessary safety precautions.
2. Explain the design and operation of welding tips.
3. Identify welding tips used in oxy-acetylene welding.
4. Determine pressures for reach size welding tip.
5. Describe tip cleaning procedures.
6. Describe the procedure for lighting and adjusting the torch to obtain each flame.

7. Describe the procedure for shutting down an oxy-acetylene station.
8. Light and adjust a welding torch to specific welding applications.

06.4 TASK: Carry a puddle without filler rod (flat position)

PERFORMANCE OBJECTIVE: Given an oxyacetylene station, 20-26 gauge mild steel coupons, personal safety equipment, and the necessary tools and materials, carry a puddle without filler rod to the flat position. The beads must be straight and uniform in height and width; have a uniform ripple formation; and have no undercut, porosity, craters, or oxidation.

ENABLING OBJECTIVES:
1. Explain the necessary safety precautions.
2. Explain the purpose of personal safety equipment.
3. Describe surface preparation procedure.
4. Determine temperatures for carrying a puddle without filler rod on mild steel.
5. Describe various methods of holding the torch.
6. Determine torch angle and speed of movement in relation to work.
7. Describe how to start and carry a puddle.
8. Explain how tip-to-work distance offsets the puddle.
9. Identify the causes of burn through porosity and oxidation.
10. Demonstrate the ability to carry a puddle without filler rod.

06.5 TASK: Carry a puddle with filler rod on mild steel (flat position)

PERFORMANCE OBJECTIVE: Given an oxyacetylene station, 20-26 gauge mild steel coupons, filler rods, personal safety equipment, and the necessary tools and materials, carry a puddle with filler rod in the flat position. The bead must be straight and uniform in height and width; have a uniform ripple formation; and have no undercut, porosity, craters, or oxidation.

ENABLING OBJECTIVES:

1. Explain the necessary safety precautions.
2. Identify filler rod by size and type for welding mild steel in the flat position.
3. Determine temperatures for carrying a puddle with filler rod on mild steel.
4. Explain the relationship between filler rod and sheet metal temperatures.
5. Describe the defects caused by insufficient heat.
6. Determine torch and filler rod angles and speed of movement in relation to work.
7. Explain how puddle buildup can be accomplished.
8. Describe ripple spacing techniques.
9. Explain how the width and height of a bead can be controlled.
10 Describe the procedure for freeing a frozen rod.
11. Explain the causes of undercut and craters.
12. Explain the methods used for filling craters.
13. Demonstrate the ability to carry a puddle with filler rod.

06.6 TASK: Construct a butt joint weld (all positions)

PERFORMANCE OBJECTIVE: Given an oxyacetylene station, 20-26 gauge mild steel coupons, filler rods, personal safety equipment, and the necessary tools and materials, construct a butt joint weld in all positions. The bead must be straight and uniform in height and width; have a uniform ripple formation; and have no undercut, porosity, craters, or oxidation. The weld must be fused with the base metal and have full penetration.

ENABLING OBJECTIVES:

1. Explain the necessary safety precautions.
2. Describe a butt joint.
3. Demonstrate the procedure for laying out sheet metal coupons to form a butt joint in all positions.
4. Determine torch and filler rod angles and speed of movement in relation to work.
5. Describe the procedure for tacking butt joints in all positions.
6. Describe techniques for building up a bead in all positions.
7. Identify causes of bead sagging in all positions.
8. Describe the procedure for welding a butt joint in all positions.
9. Explain testing methods for butt joints.
10. Construct a butt joint weld with coupons.

06.7 TASK: Construct a lap joint weld (all positions)

PERFORMANCE OBJECTIVE: Given an oxyacetylene station, 20-26 gauge mild steel coupons, filler rods, personal safety equipment, and the necessary tools and materials, construct a lap joint weld in all positions. The bead must be straight and uniform in height and width; have a uniform ripple formation; and have no undercut, porosity, craters, or oxidation. The weld must be fused with the base metal and show visible penetration on the side opposite the weld.

ENABLING OBJECTIVES:

1. Explain the necessary safety precautions.
2. Describe a lap joint.
3. Demonstrate the procedure for laying out sheet metal coupons to form a lap joint in all positions.
4. Determine torch and filler rod angles and speed of movement in relation to work.
5. Describe tacking procedures for lap joints in all positions.
6. Describe the procedure for welding lap joints in all positions.
7. Explain testing methods for lap joints.
8. Construct a lap joint weld.

06.8 TASK: Set up and adjust a gas metal arc welding (GMAW) station

PERFORMANCE OBJECTIVE: Given a gas metal arc welder, wire feed unit, remote current control, reel of electrode wire, welding gun and cable, shielding gas cylinder and hoses, ground cable, workbench with a welding fixture, and necessary reference materials, set up and adjust the gas metal arc welding station. The gas metal arc welder must be level and mounted in a dry place. The shielding gas cylinders must be securely fastened near the arc welding machine. Gas and electrical connections must be attached securely. Primary circuit cables must be installed in accordance with local electrical codes. The nozzle, electrode wire tube, and wire feed rollers must be free of dirt and chips. Selection of wire type and size and adjustments for gas flow, wire feed speed, and current setting must be in accordance with manufacturer's specifications.

ENABLING OBJECTIVES:

1. Define gas metal arc welding terms.
2. Identify symbols and notations.
3. Explain safety rules concerning the ventilation, fireproofing, and electrical shockproofing of a welding station.
4. Describe the procedures for positioning and securing the gas metal arc welder and shielding gas cylinder.
5. Identify the power source by current type.
6. Describe the procedure for installing the primary circuit cables on a gas metal arc welder.
7. Explain the safety rules for storing and transporting shielding gas cylinders.
8. Describe the procedure for cleaning cylinder valves and hoses for detecting gas leaks.
9. Identify shielding gases for gas metal arc welding.
10. Describe the procedure for attaching wire feed unit, gun and cable, and shielding gas hoses.
11. Identify electrode wires by type and size for welding mild steel, aluminum, and high-strength steels.
12. Identify the wire feed rollers required for various sizes and types of electrode wire.
13. Describe the loading procedure for electrode wire.
14. Identify critical cleaning areas and describe cleaning procedures for gas metal arc welding equipment.
15. Describe the operation of the on/off switch, the remote current control, the gas flow control, and the wire feed speed control.
16. Describe the procedure for adjusting gas flow, wire feed speed, and current setting.
17. Set up and adjust a gas metal arc welding station.

06.9 TASK: Weld a straight bead pattern on mild and high strength steel (flat position)

PERFORMANCE OBJECTIVE: Given a gas metal arc welding station, 20-26 gauge mild steel, high strength steel coupons, personal safety equipment, and the necessary tools and materials, weld a straight bead pattern in the flat position. Beads must be straight and uniform in height and width; have a uniform ripple formation; have no undercut, porosity, craters, or oxidation; and be fused with base metal.

ENABLING OBJECTIVES:

1. Explain the necessary safety precautions.
2. Explain the purpose of personal safety equipment
3. Describe surface preparation procedures for mild steel and high-strength steel.
4. Explain the method for striking and maintaining an arc with the gas metal arc welder.
5. Determine electrode wire gun angle and speed of movement in relation to work.
6. Explain the technique for building up a bead in the flat position.
7. Identify causes of bead sagging when welding in the flat position.
8. Describe the procedure for welding a straight bead pattern in the flat position.
9. Identify the causes of undercut, porosity, craters, and oxidation.
10. Determine electrode wire type and size, wire feed speed, and current setting for welding high-strength steel in the flat position.
11. Describe testing methods.
12. Weld a straight bead pattern on steel.

06.10 TASK: Weld a straight bead pattern on aluminum (flat position)

PERFORMANCE OBJECTIVE: Given a gas metal arc welding station, 20-26 gauge aluminum coupons, personal safety equipment, and the necessary tools and materials, weld a straight bead pattern in the flat position. Beads must be straight and uniform in height and width; have a uniform ripple formation; have no undercut, porosity, craters, or oxidation; and be fused with base metal.

ENABLING OBJECTIVES:

1. Explain the necessary safety precautions.
2. Describe surface preparation procedures for aluminum.
3. Determine electrode wire type and size, wire feed speed, and current setting for welding aluminum in the flat position.
4. Determine gun angle and speed of movement in relation to work.
5. Weld a straight bead pattern on aluminum.

06.11 TASK: Construct a butt joint weld (all positions)

PERFORMANCE OBJECTIVE: Given a gas metal arc welding station, 20-26 gauge mild steel, or high-strength steel coupons, personal safety equipment, and the necessary tools and materials, construct a butt weld in all positions. Beads must be straight and uniform in height and width; have a uniform ripple formation; have no undercut, porosity, craters, or oxidation; and be fused with base metal and have full penetration.

ENABLING OBJECTIVES:

1. Explain the necessary safety precautions.
2. Describe a butt joint.
3. Determine torch and filler rod angles and speed of movement in relation to work.
4. Describe the procedure for tacking butt joints in all positions.
5. Identify causes of bead sagging in all positions.
6. Describe the procedure for welding a butt joint in all positions.
7. Explain testing methods for butt joints.
8. Describe the procedure for tacking butt joints in all positions.
9. Identify filler rod by types and sizes for welding mild steel in all positions.
10. Demonstrate the procedure for laying out sheet metal coupons to form a butt joint in flat, horizontal, vertical and overhead positions.
11. Construct a butt joint weld in all positions.

06.12 TASK: Construct a lap joint weld (all positions)

PERFORMANCE OBJECTIVE: Given a gas metal arc welding station, 20-26 gauge mild steel or high-strength steel coupons, personal safety equipment, and the necessary tools and materials, construct a lap joint weld in all positions. Beads must be straight and uniform in height and width; have a uniform ripple formation; have no undercut, porosity, craters, or oxidation; and be fused with base metal and have full penetration.

ENABLING OBJECTIVES:

1. Explain the necessary safety precautions.
2. Describe a lap joint.
3. Determine torch and filler rod angles and speed of movement in relation to work.

4. Describe tacking procedures for lap joints in all positions.
5. Describe the procedure for welding a lap joint in all positions.
6. Explain testing methods for lap joints.
7. Demonstrate the procedure for laying out sheet metal coupons to form a lap joint in flat, horizontal, vertical and overhead positions.
8. Construct a lap joint weld in all positions.

06.13 TASK: Construct a plug weld

PERFORMANCE OBJECTIVE: Given a gas metal arc welding station, 20-26 gauge mild steel, aluminum, or high-strength steel coupons, spot weld cutter bits or hole punchers in 3/8, 9/32, 1/4, and 3/16" sizes, clamping tools, personal safety equipment, and the necessary tools and materials, construct a plug weld. The weld must be fused with thicker or bottom panel melted first.

ENABLING OBJECTIVES:
1. Explain the necessary safety precautions.
2. Describe a plug weld.
3. Determine the proper filler rod for a plug weld on:
   (a) mild steel
   (b) aluminum
   (c) high-strength steel
4. Explain why the panels to be welded must be arranged by thickness.
5. Explain why different size holes are used when welding more than two panels together.
6. Demonstrate the procedure for holing the outer panel(s)and laying out and clamping the panels to form a plug matrix.
7. Construct a plug weld.

06.14 TASK: Construct a spot weld

PERFORMANCE OBJECTIVE: Given a gas metal arc welding station, two 20-26 gauge mild steel, aluminum,or high-strength steel coupons, panel crimper, clamping tools, personal safety equipment, and the necessary tools and materials, construct a spot weld. The weld must penetrate the bottom coupon so as to create a fusion and strong bond with the top coupon.

ENABLING OBJECTIVES:

1. Describe a spot weld.
2. Demonstrate the procedure for holding and fusing the two pieces of material so a strong bond can be created.
3. Determine the proper heat and exposure time to create a proper bond.
4. Explain why panels may or may not have to be crimped to do the proper welding procedure.
5. Explain areas of use for a spot weld and its advantages.
6. Explain necessary safety precautions.
7. Construct a spot weld.

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MODULE VII

BASIC PANEL REPAIR

07.1 TASK: Rough out and align steel panels

PERFORMANCE OBJECTIVE: Given damaged steel body panels, body hammers, dollies, body files, pick hammers, grinder, body spoons, slide hammers, manual and hydraulic push-pull equipment, and the necessary tools, equipment, and materials, rough out and align steel panels. The panels must be aligned with adjacent panels and restored to within 1/8" of original contour.

ENABLING OBJECTIVES:

1. Explain the necessary safety precautions.
2. Explain the properties of mild steel, (a) plasticity, (b) elasticity, and (c) work hardening.
3. Explain the diagnosis of auto body damage, (a) direct damage, (b) indirect damage, (c) stretching, (d) displaced metal, and (e) buckles.
4. Explain the difference between "on-dolly" and "off-dolly" hammering.
5. Describe the procedure for roughing out panels.
6. Explain the techniques used to rough out steel panels.
7. Explain the precautions to avoid stretching metal.
8. Explain the purpose of diagonal checking.
9. Describe diagonal checking and alignment procedures.
10. Identify and demonstrate the safe use of (a) body hammers and dollies, (b) body files and pick hammers, (c) grinders and discs, (d) body spoons and slide hammers, (e) jacks, adapters, tubing and caps, and (f) manual and light duty hydraulic push pull equipment.
11. Rough out and align steel panels.

07.2 TASK: Shrink stretched areas on steel panels

PERFORMANCE OBJECTIVE: Given damaged steel panels, and the necessary tools, equipment, and materials, shrink stretched areas on steel panels. The required areas must be no higher than the surrounding area and no more than 1/4" lower than the surrounding area with no additional damage caused.

ENABLING OBJECTIVES:

1. Explain the necessary safety precautions.
2. Describe the procedure for heating, hammering, and cooling panels.
3. Explain techniques used for shrinking steel panels.
4. Shrink stretched areas on steel panels.

07.3 TASK: Finish metal panels

PERFORMANCE OBJECTIVE: Given a sheet metal panel which has been roughed out and aligned, and the necessary tools, equipment, and materials, finish the metal to the specifications given as necessary for refinishing. There must be no additional damage to the panel.

ENABLING OBJECTIVES:

1. Demonstrate the use of the types of grinders used in body sheet metal repair.
2. Explain the angles of contact of the disc off the metal.
3. Demonstrate buffing with the body grinder.
4. Demonstrate crosscutting with the body grinder.
5. Demonstrate metal polishing with the body grinder.
6. Identify filing hatch patterns.
7. Demonstrate the method for picking up low and high spots.
8. Grind, pick, and file (a) a flat panel, and (b) a high crown panel.
9. Finish buff a panel.

07.4 TASK: Fill and finish depressed area

PERFORMANCE OBJECTIVE: Given a vehicle or sheet metal panel with areas of damage not exceeding 1/4" in depth plastic filler, particle mask, and the necessary tools, equipment, and materials, fill and finish the depressed areas. The finished surface must be free of grooves and indentations and must conform to the surrounding area. There must be no additional damage to the panel.

ENABLING OBJECTIVES:

1. Identify and demonstrate the use of (a) spreaders, (b) grater blades, (c) grinder and discs, (d) plastic, (e) hardener, and (f) sanders.
2. Demonstrate the procedure for applying and finishing filling materials.
3. Fill and finish depressed areas on vehicle panels.

07.5 TASK: Repair rusted areas

PERFORMANCE OBJECTIVE: Given a vehicle or panel with rusted areas, sandblasting equipment, grinder, plastic filler, particle mask, and the necessary tools, equipment, and materials, repair or replace the rusted areas. The metal surface must be free of rust and treated with a rust inhibitor. The restored area must be filled and the finished surface must be free of grooves and indentations and conform to the surrounding area. There must be no additional damage to the surrounding surface.

ENABLING OBJECTIVES:

1. Explain the necessary safety precautions.
2. Identify rust inhibitors and filler materials.
3. Identify possible replacement, after market, or original equipment manufacturers parts.
4. Explain the purpose of treating bare metal before refinishing.
5. Describe the procedure for applying and finishing filling materials.
6. Demonstrate the use of sandblasting equipment.
7. Repair a rusted area on a vehicle panel.

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MODULE VIII

PANEL REPLACEMENT

MODULE VIII - Panel Replacement

08.1 TASK: Remove and replace a bolt-on panel

PERFORMANCE OBJECTIVE: Given a vehicle with bolt-on panels, service manual, and the necessary tools, equipment, and materials, remove and replace the bolt-on panel in accordance with manufacturer's specifications. The panel must be securely attached using the specified type, size, and number of fasteners and must be aligned with the adjacent panels. There must be no damage caused to adjacent panels and the task must be completed in flat rate time + 50%.

ENABLING OBJECTIVES:

1. Identify fasteners used for bolt-on panels.
2. Describe bolt-on panel replacement procedures.
3. Describe bolt-on panel alignment and adjustment procedures.
4. Demonstrate the use of panel replacement tools and equipment.
5. Remove and replace bolt-on panels within flat rate time plus 50%.

08.2 TASK: Remove and replace a weld-on panel

PERFORMANCE OBJECTIVE: Given a vehicle with a damaged weld-on panel, welding station, rods, grinders, body clamps, personal safety equipment, and the necessary tools, equipment, and materials, remove and replace the weld-on panel in accordance with manufacturer's specifications. The panel must align with adjacent panels and be welded securely without warpage. The surface finish at all joints must be ground and filled to conform to the surrounding surface with no damage to adjacent panels. The task must be completed in flat rate time + 50%.

ENABLING OBJECTIVES:

1. Explain the necessary safety precautions.
2. Describe panel replacement procedures.
3. Describe panel alignment procedures.
4. Identify and demonstrate the use of vise grips and clamping devices.
5. Demonstrate welding techniques for panel replacement.
6. Demonstrate the use of grinders.
7. Remove and replace a weld-on panel with flat rate +50%

08.3 TASK: Remove, replace, and align a door

PERFORMANCE OBJECTIVE: Given a vehicle with a damaged door, and the necessary tools, equipment and materials, remove, replace, and align the door in accordance with manufacturer's specifications. The door must be secured and aligned with the body. The striker plate/pin and the hinge adjustments must allow for fully operational locks. Door clearances must be equal on all surrounding panels with no additional damage caused. The task must be completed in flat rate time + 50%.

ENABLING OBJECTIVES:

1. Explain the necessary safety precautions.
2. Identify the adjustment points on doors.
3. Explain the causes of door sag.
4. Describe types of door misalignment.
5. Describe door removal/replacement procedures.
6. Describe door alignment procedures.
7. Demonstrate the use of door removal and alignment tools.
8. Remove, replace, and align a door within flat rate time plus 50%.

08.4 TASKS: Remove, replace, and align hood and deck panels

PERFORMANCE OBJECTIVE: Given a vehicle with damaged hood and deck panels, and the necessary tools, equipment, and materials, remove, replace, and align the hood and deck panel in accordance with manufacturer's specifications. Hood and deck panels must be secured and aligned with body. The hinge and latch adjustments must allow for smooth opening and closing. Hood and deck panel clearances must be equal on all surrounding panels with no damage caused to adjacent surfaces. The task must be completed in flat rate time + 50%.

ENABLING OBJECTIVES:

1. Explain the necessary safety precautions.
2. Identify adjustment points on hood and deck panels.
3. Describe types of hood and deck panel misalignment.
4. Describe hood and deck panel removal and replacement procedures.
5. Describe hood and deck panel alignment procedures.
6. Demonstrate the use of hood and deck replacement tools and equipment.
7. Remove, replace, and align hood panels in flat rate time plus 50%.
8. Remove, replace, and align deck panels in flat rate time plus 50%.

08.5 TASK: Remove, align, and replace a unitized weld-on panel

PERFORMANCE OBJECTIVE: Given a unitized vehicle, service manual, gas metal arc welder, measuring and straightening equipment, drill, grinder, solvents, personal safety equipment, and the necessary tools, equipment, and materials, remove, align, and replace a unitized weld-on panel in accordance with manufacturer's specifications. The panel must be in alignment with adjacent panels and spot welded securely at factory seams. The surface finish at all joints must conform to the surrounding surface and be free of grooves and indentations. The body must be in alignment at all factory reference points with no additional damage caused.

ENABLING OBJECTIVES:

1. Explain the necessary safety precautions.
2. Identify types of unitized collision repair straightening systems.
3. Identify (a) drill bits, (b) electrode wire type and size, (c) grinder attachments, and (d) cleaning solvents used to repair a unitized weld-on panel.
4. Identify applications of different high-strength steels in automobile construction.
5. Describe the procedure for replacing and aligning a unitized weld-on panel.
6. Remove, align, and replace a unitized weld-on panel.

IDAHO CURRICULUM STANDARDS FOR AUTOBODY TECHNOLOGY

MODULE IX

BODY AND FRAME

MODULE IX - Body and Frame

*** CAUTION ***

- Be certain to disconnect the battery before working on any vehicle.
- Care must be taken when removing the following components:

a. Gas shocks
b. Low MPH collision bumpers
c. Computerized Modules
d. Energy absorbers
e. Computer adjusted suspension
f. Air bags

09.1 TASK: Determine conventional body shell and frame alignment

PERFORMANCE OBJECTIVE: Given a vehicle requiring body and frame inspection, frame gauges, and the necessary tools, equipment, and materials, determine body shell and frame alignment. Measurement for reference points outside manufacturer's specifications must be detected.

ENABLING OBJECTIVES:

1. Solve problems involving multiplication and division of whole numbers.
2. Solve problems involving multiplication and division of fractions.
3. Explain the necessary safety precautions.
4. Define datum line and center line.
5. Explain why a vehicle must be on four supports of equal height when using a centering gauge.
6. Describe types of conventional body shells and frames.
7. Identify types of damage to frames and bodies.
8. Describe the procedure for determining body and frame alignment.
9. Demonstrate the use of tram and centering gauges.

09.2 TASK: Align conventional body shell and frame

PERFORMANCE OBJECTIVE: Given a vehicle with a conventional frame requiring alignment, frame alignment equipment, tram gauge, and the necessary tools, equipment, and materials, align the body shell and frame to manufacturer's specifications at all factory reference points.

ENABLING OBJECTIVES:

1. Solve English and metric dimensional measurement problems.
2. Explain the necessary safety precautions.
3. Describe the use of a tram gauge in determining body shell and frame alignment.
4. Describe the procedure for aligning conventional body shell and frames with stationary and/or portable equipment.
5. Demonstrate the use of stationary and/or portable frame alignment equipment.
6. Align a body shell to manufacturer's specifications.

09.3 TASK: Repair frame horns and cross members

PERFORMANCE OBJECTIVE: Given a vehicle with damaged frame horns and cross members and the necessary tools, equipment, and materials, repair the frame horns and cross members. The frame horns and cross members must be in alignment with manufacturer's specifications. No additional damage will be caused.

ENABLING OBJECTIVES:

1. Explain the necessary safety precautions.
2. Explain the design and function of frame horns and cross members.
3. Explain the method used to determine damage to frame horns and cross members.
4. Describe the procedure for repairing frame horns and cross members.
5. Demonstrate the use of measuring instruments.
6. Repair and align a frame horn to manufacturer's specification.
7. Repair and align a cross member to manufacturer's specifications.

09.4 TASK: Determine unitized body shell alignment

PERFORMANCE OBJECTIVE: Given a unitized vehicle, data sheets, unitized collision measuring system, service manual, and the necessary tools, equipment, and materials, determine unitized body shell alignment. Measurements for steering assembly mount, front and rear wheels, and body shell factory reference points outside manufacturer's specifications must be detected.

ENABLING OBJECTIVES:

1. Explain the necessary safety precautions.
2. Explain the operation of universal and dedicated bench systems, centering and/or tram gauges.
3. Describe the procedure for determining unitized body shell alignment using a dedicated or universal bench system.
4. Describe types of unitized body shells.
5. Identify fixtures for a dedicated bench system.
6. Determine specifications and reference points for measurements of steering assembly mount, front and rear wheels and body shell.

09.5 TASK: Align a unitized body shell

PERFORMANCE OBJECTIVE: Given a unitized vehicle requiring body shell alignment, data sheets, service manual, unitized collision measuring system, and the necessary tools, equipment, and materials, align the unitized body shell. The body shell must be in alignment at all factory reference points with no additional damage caused.

ENABLING OBJECTIVES:

1. Identify and demonstrate the use of (a) unitized body clamps and (b) centering gauge adapters.
2. Describe the procedure for aligning a unitized body shell with a universal or dedicated bench system, centering and/or tram gauges.
3. Explain the necessary safety precautions.
4. Align a unitized body shell to all factory reference points.

IDAHO CURRICULUM STANDARDS FOR AUTOBODY TECHNOLOGY

MODULE X

STEERING AND SUSPENSION

MODULE X - Steering and Suspension

10.1 TASK: Inspect steering gear and linkage

PERFORMANCE OBJECTIVE: Given a vehicle, service manual, and necessary tools, inspect the steering gear and linkage. Any parts that are worn or damaged will be listed.

ENABLING OBJECTIVES:
1. Explain the safety precautions when working under a raised vehicle.
2. Explain the importance, safety-wise, of inspecting the steering gear and linkage.
3. Demonstrate methods of testing parts for excessive wear or damage.
4. Identify steering parts to be inspected.
5. Describe an excessive worn or damage part.
6. List all worn or damaged parts.

10.2 TASK: Adjust steering sector (manual and power)

PERFORMANCE OBJECTIVE: Given a vehicle, service manual, and tools, adjust steering sector. Steering sector play must be within specifications and no rough steering when turning from extreme left to extreme right. The adjustment screw must be secure when the task is completed.

ENABLING OBJECTIVES:
1. Explain safety precautions when working on steering parts.
2. Describe the major difference in adjusting manual steering sector versus a power steering sector.
3. Inspect for excessively worn parts.
4. Demonstrate adjustment of steering sector.
5. Demonstrate operational test after adjustment.

10.3 TASK: Remove and replace steering components

PERFORMANCE OBJECTIVE: Given a vehicle, service manual, and proper tools, remove and replace steering linkage components in accordance with manufacturer's specifications. Some items to be included here are:

1. Tie rod
2. Center link (drag link)
3. Pitman arm
4. Idler arm
5. Steering knuckle
6. Steering sector
7. Damper
8. Steering arm
9. Belts, hoses, and pumps

ENABLING OBJECTIVES:

1. Explain safety precautions when working on steering components.
2. Explain the importance of doing thorough work with steering components because of the safety factor.
3. Identify all steering components.
4. Describe function of each component.
5. Inspect all steering parts for proper security (lock nuts and cotter pins).
6. Demonstrate the use of a tie rod separator.
7. Demonstrate removal and replacement of steering parts selected for replacement.

10.4 TASK: Replace rack and pinion steering assembly

PERFORMANCE OBJECTIVE: Given a vehicle, service manual, and proper tools, replace rack and pinion steering assembly in accordance with manufacturer's specifications. Upon completion, the unit must turn smoothly, have proper free play and not leak. All bolts will be torqued according to specifications.

ENABLING OBJECTIVES:

1. Explain safety procedure when working on steering systems.
2. Identify components of a rack and pinion assembly.
3. Explain the operation of a rack and pinion assembly as compared to a conventional steering box.
4. Inspect for worn and damaged parts.
5. Demonstrate removal and replacement of the rack and pinion component.
6. Demonstrate operational test.

10.5 TASK: Align front suspension, power train and steering components

PERFORMANCE OBJECTIVE: Given a vehicle, service manual, and necessary tools and equipment, align front-end. Upon completion, the toe, caster, and camber will be checked against manufacturer's specifications. The power train and suspension components must be adjusted to manufacturer's specifications.

ENABLING OBJECTIVES:
1. Explain the safety precautions when working under a vehicle.
2. Define toe-in, caster, and camber.
3. Identify adjustment points of the front end for toe-in, caster, and camber setting.
4. Describe the tools and equipment necessary to align an automobile front end.
5. Demonstrate front end alignment procedure.

10.6 TASK: Align rear suspension and power train

PERFORMANCE OBJECTIVE: Given a vehicle, service manual, and necessary tools, align rear suspension. Upon completion, the vehicle readings must be within book specifications. Adjustments to drag link, differential (as appropriate), as well as body mounting points must meet manufacturer's specifications.

ENABLING OBJECTIVES:
1. Explain safety precautions when working under a vehicle.
2. Identify several cars that have an adjustable rear end.
3. Identify the rear end adjustment points.
4. Demonstrate use of the equipment necessary to align the vehicle rear end.

10.7 TASK: Remove and replace steering wheel and mast jacket.

PERFORMANCE OBJECTIVE: Given a vehicle, service manual, and tools, remove and replace the steering wheel and mast jacket. When completed, the steering wheel should be straight, nut tightened, horn hooked up properly and no damage done to steering wheel cover. The mast jacket should be tight, in proper alignment and operational for shifting gears.

ENABLING OBJECTIVES:

1. Explain safety precautions when working inside a vehicle.
2. Identify components of a mast jacket and steering wheel assembly.
3. Identify thread and bolt size for puller to be used on a specific vehicle.
4. Explain the purpose of a mast jacket.
5. Demonstrate how to use a steering wheel puller.
6. Demonstrate proper removal and replacement of steering wheel and related parts.
7. Demonstrate removal of all related parts.
8. Demonstrate removal and replacement of mast jacket, special care and precautions.
9. Demonstrate operational test of mast jacket and all related parts.

10.8 TASK: Repair tilt and/or telescopic steering wheel column

PERFORMANCE OBJECTIVE: Given a vehicle, service manual, and necessary tools, repair the tilt or telescopic steering wheel. This will include replacement of:

1. Small parts kit.
2. Bearing.
3. Locking assembly.

Upon completion, the steering wheel column will be checked for proper operation and security.

ENABLING OBJECTIVES:

1. Explain safety precautions when working inside a vehicle.
2. Identify components of a tilt and/or telescopic steering wheel column of the specific vehicle.
3. Explain how a tilt or telescopic wheel column operates.
4. Demonstrate removal and replacement of damaged parts.
5. Demonstrate removal of related parts to expose the assembly to be repaired.
6. Demonstrate operational test of repaired unit and related parts.

10.9 TASK: Inspect, remove, and replace dual control arm suspension system

PERFORMANCE OBJECTIVE: Given a dual control arm suspension system, service manual, necessary tools and equipment, inspect, remove and replace components of the suspension system. When completed, all components must be securely attached, all bolts and fasteners torqued to proper specifications, all control arm components must operate freely with no binding, and appropriate lubrication applied. The vehicle must be within specified curb height specifications.

ENABLING OBJECTIVES:

1. Explain safety precautions when removing major suspension components.
2. Identify the different types of suspension systems.
3. Describe the proper procedure in order to inspect the suspension system.
4. Describe the function of a shock absorber.
5. Identify steering linkage parts.
6. Identify defective front and rear suspension assemblies.
7. Inspect tire and wheel assembly.
8. Describe several areas of danger involved in control arm replacement.
9. Explain why the front end must be aligned after installing new control arms.
10. Demonstrate ability to control coil spring while removing and replacing control arms.
11. Demonstrate replacement of control arm with correct positioning of bushings to avoid "bushing windage."

10.10 TASK: Inspect, remove, and replace McPherson strut suspension assembly

PERFORMANCE OBJECTIVE: Given a vehicle, service manual, and necessary tools, inspect, remove and replace the McPherson strut assembly. All attachment hardware must be torqued to specifications, ride height must be correct, and wheels must turn to their extreme without binding.

ENABLING OBJECTIVES:

1. Explain safety precautions when working on a raised vehicle.
2. Identify several cars that are McPherson strut equipped and discuss their differences.
3. Explain special tools used for a safe operation.

4. Describe a McPherson strut assembly and control of the coil spring.
5. Demonstrate removal of strut assembly and control of the coil spring.
6. Demonstrate replacement of strut assembly and all related parts.

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MODULE XI

ELECTRICAL SYSTEMS

MODULE XI - Electrical Systems

*** CAUTION ***
Be certain to disconnect battery before working on vehicles

11.1 TASK: Perform battery service(s)

PERFORMANCE OBJECTIVE: Given a vehicle with negative ground, service manual, battery cables, terminal spreader, battery terminal puller, volt-ohm meter, replacement battery, lift strap, hydrometer, and the necessary tools, equipment and materials, service a battery, remove and replace the battery cables, remove and replace the battery, and/or charge the battery. The electrolyte level of each battery cell must be in accordance with manufacturer's specifications. Cracks or punctures in the casing, damage to cell caps, and loose battery posts must be detected. The battery surface, posts, and cable connections must be free of corrosion, dirt and foreign material. The positive cable must be attached to the starter solenoid and to the positive terminal. The connections must be mechanically and electrically secure and the battery cables must be free of electrical hazards. The battery must be mounted securely by fasteners in the battery retainer. The battery cables must be attached positive to positive and negative to negative, and the connections must be mechanically and electrically secure. The voltage and specific gravity of the charged battery must be within manufacturer's specifications.

ENABLING OBJECTIVES:

1. Explain the necessary safety precautions.
2. Describe the procedure for adding water to a battery.
3. Identify signs indicating a cracked battery case.
4. Describe the procedure for inspecting a cracked battery case.
5. Identify types of battery cables.
6. Describe the procedure for removing and replacing battery cables.
7. Explain the difference between positive and negative ground systems.
8. Identify types of batteries.
9. Describe the procedure for removing and replacing a battery.
10. Describe the procedure for charging a battery.
11. Identify the restrictions on quick-charging.

12. Demonstrate the use of a volt-ohm meter.
13. Demonstrate the use of battery cable removal tools.
14. Demonstrate the use of a battery lift strap.
15. Demonstrate the use of a battery hydrometer to test a battery's state of charge.

11.2 TASK: Test, remove, and replace a switch

PERFORMANCE OBJECTIVE: Given a vehicle, service manual, volt-ohm meter, wiring diagram, replacement switch, and the necessary tools, equipment, and materials, test and/or remove and replace the switch. The switch must be mounted securely in its specified location and the connections must be mechanically and electrically secure. The wiring must be in accordance with the wiring diagram and free of electrical hazards. The switch must operate in accordance with the manufacturer's specifications.

ENABLING OBJECTIVES:
1. Explain the necessary safety precautions.
2. Explain how to read a wiring diagram
3. Identify types of automobile switches by function and operation.
4. Reference specifications for source voltage and resistance of a switch using a service manual.
5. Describe the procedure for using a volt-ohm meter to test a switch.
6. Explain the operation of a switch.
7. Explain the wiring methods used for switches.
8. Describe the installation procedures for switches.
9. Test, remove, and replace a faulty switch.

11.3 TASK: Test, remove, and replace a fuse

PERFORMANCE OBJECTIVE: Given a vehicle, service manual, volt-ohm meter, replacement fuse, fuse puller, and the necessary tools, equipment, and materials, test and/or remove and replace a fuse. The replacement fuse must be the specified size, type and capacity, and be mounted mechanically and electrically secure in the fuse holder.

ENABLING OBJECTIVES:
1. Explain the necessary safety precautions.
2. Reference specifications for fuse amperage using a service manual.
3. Explain the purpose of a fuse.
4. Describe installation procedures for fuses.

5. Identify fuses by size, type and capacity.
6. Describe the procedure for using a volt-ohm meter to test a fuse.
7. Demonstrate the use of a fuse puller.
8. Test, remove, and replace a fuse.

11.4 TASK: Test, remove, and replace circuit breaker

PERFORMANCE OBJECTIVE: Given a vehicle, service manual, volt-ohm meter, wiring diagram, replacement circuit breaker, and the necessary tools and materials, test and/or remove and replace a circuit breaker. The circuit breaker must be mounted securely, and the connections must be mechanically and electrically secure. The wiring must be in accordance with the wiring diagram and free of electrical hazards. The circuit breaker must operate in accordance with the manufacturer's specifications.

ENABLING OBJECTIVES:
1. Explain the necessary safety precautions.
2. Explain the operation of a circuit breaker.
3. Explain the wiring methods used for circuit breakers.
4. Describe the procedure for testing a circuit breaker.
5. Identify circuit breaker by type and capacity.
6. Test, remove, and replace a faulty circuit breaker.

11.5 TASK: Remove and replace a wiring harness

PERFORMANCE OBJECTIVE: Given a vehicle, service manual, wiring diagram, replacement wiring harness, and the necessary tools, equipment, and materials, remove and replace a wiring harness. The wiring harness must be routed and wired in accordance with the wiring diagram and free of electrical hazards. The connections must be mechanically and electrically secure.

ENABLING OBJECTIVES:
1. Explain the necessary safety precautions.
2. Explain the purpose of a wiring harness.
3. Explain the color coding system for the wires in a wiring harness.
4. Describe the procedure for installing a wiring harness.
5. Remove and replace a wiring harness.

11.6 TASK: Remove and replace a lamp socket

PERFORMANCE OBJECTIVE: Given a vehicle, service manual, wiring diagram, replacement socket, and the necessary tools, equipment, and materials, remove and replace a socket. The socket must be mounted securely and the connections must be mechanically and electrically secure. The wiring must be in accordance with the wiring diagram and free of electrical hazards.

ENABLING OBJECTIVES:
1. Explain the necessary safety precautions.
2. Identify sockets by type, size and function.
3. Explain the operation of sockets.
4. Explain wiring methods for sockets.
5. Describe the procedure for removing and replacing a socket.
6. Remove and replace a faulty lamp socket.

11.7 TASK: Perform an operational test of lighting circuits

PERFORMANCE OBJECTIVE: Given a vehicle, service manual, volt-ohm meter, and the necessary tools, equipment, and materials, perform an operational test of the lighting circuits. Shorts, opens, grounds, resistance outside manufacturer's specifications, and malfunctioning bulbs must be detected in the following circuits: (a) parking lights, (b) headlights (high and low beam), (c) tail lights, (d) turn signal lights, (e) emergency signal lights, (f) brake lights, (g) marker lights, (h) back-up lights, (i) license plate light, (j) interior lights, and (k) dash lights. Remove and replace defective bulbs. The bulbs must fit securely in the socket and operate in accordance with manufacturer's specifications.

ENABLING OBJECTIVES:
1. Explain the necessary safety precautions.
2. Identify switches, fuses, bulbs, and sockets and explaining their function in each external lighting circuit.
3. Identify circuits and components on a wiring diagram.
4. Explain how to trace a circuit.
5. Describe circuit resistance test procedures.
6. Describe bulb inspection and test procedures.
7. Identify bulbs by type, size and function.
8. Explain the operation of a bulb.
9. Describe the procedure for removing and replacing bulbs.
10. Perform an operational test of lighting circuits.
11. Replace defective bulbs.

11.8 TASK: Remove, replace, and adjust headlights

PERFORMANCE OBJECTIVE: Given a vehicle, service manual, replacement headlights, and the necessary tools, equipment, and materials, remove and replace the headlights. The headlights must be mounted securely with the specified type and number of fasteners, and the plug connections must be mechanically and electrically secure. The headlights must operate in the off, low beam, and high beam modes. Headlight adjustments for level and convergence must be in accordance with manufacturer's specifications. The task must be completed in flat rate time + 50%.

ENABLING OBJECTIVES:

1. Explain the necessary safety precautions.
2. Explain how headlights operate.
3. Explain the effects of sagged springs.
4. Describe the procedure for proper headlight alignment.
5. Describe the procedure for removing and replacing headlights.
6. Demonstrate the proper procedure for handling and installing halogen bulbs.
7. Determine car riding heights for high and low beams.
8. Demonstrate the use of headlight aiming equipment.
9. Remove, replace, and adjust headlights.

11.9 TASK: Test, remove and replace horn circuit, relay, and horn assembly

PERFORMANCE OBJECTIVE: Given a vehicle, service manual, wiring diagram, replacement horn relay, horn assembly, and the necessary tools, equipment, and materials, remove and replace a horn relay or horn. The component must be mounted securely and the connections must be mechanically and electrically secure. The wiring must be in accordance with the wiring diagram and free of electrical hazards. The components must operate in accordance with the manufacturer's specifications.

ENABLING OBJECTIVES:

1. Explain the necessary safety precautions.
2. Identify the components in a horn circuit.
3. Describe the procedure for using a volt-ohm meter to test a horn circuit.
4. Describe removal and replacement procedure of horn.

5. Explain the operation of a horn relay.
6. Describe the wiring methods used for horn relays.
7. Describe the procedure for removing and replacing a horn relay.
8. Test horn circuit.
9. Remove, and replace horn, relay, and horn assembly.

11.10 TASK: Test an electric motor

PERFORMANCE OBJECTIVE: Given a vehicle, service manual, wiring diagram, volt-ohm meter, and the necessary tools, equipment, and materials, test a wiper, power window, power seat, or antenna motor. Deviations in source voltage and continuity outside of manufacturer's specifications must be detected.

ENABLING OBJECTIVES:
1. Explain the necessary safety precautions.
2. Define source voltage and continuity.
3. Identify automotive electric motors by type, size, and function.
4. Explain the operation of an electric motor.
5. Describe the procedure for using a volt-ohm meter to test an electric motor.
6. Test an electric motor.

11.11 TASK: Remove and replace a power window motor

PERFORMANCE OBJECTIVE: Given a vehicle equipped with power windows, a service manual, wiring diagram, replacement motor, volt-ohm meter and the necessary tools, equipment, and materials, remove and replace a power window motor. The motor must be mounted securely and connections must be mechanically and electrically secure. Wiring to source voltage and motor leads must be in accordance with the wiring diagram and free of electrical hazards. The motor must operate freely without binding in both directions.

ENABLING OBJECTIVES:
1. Explain the necessary safety precautions.
2. Identify power window motors.
3. Explain the operation of power window motor circuits.
4. Explain the wiring methods used for power window motors.
5. Describe the procedure for removing and replacing a power window motor.
6. Remove and replace a faulty power window motor.

11.12 TASK: Remove and replace power seat controls

PERFORMANCE OBJECTIVE: Given a vehicle equipped with power seats, a service manual, wiring diagram, test equipment, and the necessary tools and materials, remove and replace the power seat controls. The wiring must follow the wiring diagram and must be free of electrical hazards. The connections must be mechanically and electrically secure and the adjustment control must operate in all directional modes specified in the service manual.

ENABLING OBJECTIVES:
1. Explain the necessary safety precautions.
2. Explain the operation of multi-directional power seat mechanisms.
3. Describe the replacement procedure for power seat controls.
4. Remove and replace power seat controls.

11.13 TASK: Remove and replace a power seat motor

PERFORMANCE OBJECTIVE: Given a vehicle equipped with power seats, a service manual, wiring diagram, replacement motor, volt-ohm meter, and the necessary tools, equipment, and materials, remove and replace a power seat motor. The motor must be mounted securely and connections must be mechanically and electrically secure. Wiring to source voltage and motor leads must be in accordance with the wiring diagram and free of electrical hazards. The motor must operate under load, and the seat adjustment mechanism must operate in all modes.

ENABLING OBJECTIVES:
1. Explain the necessary safety precautions.
2. Identify power seat motors.
3. Explain the operation of power seat circuits.
4. Explain the wiring method for a power seat motor.
5. Describe the procedure for removing and replacing a power seat motor.
6. Remove and replace a power seat motor.

11.14 TASK: Remove and replace a power antenna assembly

PERFORMANCE OBJECTIVE: Given a vehicle, equipped with a power antenna, service manual, volt-ohm meter, replacement power antenna assembly, and the necessary tools, equipment, and materials, remove and replace the power antenna motor. The antenna must be mounted securely and connections must be mechanically and electrically secure. The wiring must be in accordance with the wiring diagram and free of electrical hazards. The motor must operate under load, and the antenna must operate in both directions.

ENABLING OBJECTIVES:
1. Explain the necessary precautions.
2. Identify power antenna assemblies.
3. Explain the operation of a power antenna motor.
4. Explain the wiring method used for a power antenna assembly.
5. Describe the procedure for removing and replacing a power antenna assembly.
6. Remove and replace a power antenna assembly.

11.15 TASK: Remove and replace an antenna

PERFORMANCE OBJECTIVE: Given a vehicle, service manual, routing diagram, replacement antenna, and the necessary tools, equipment, and materials, remove and replace the antenna. The antenna must be mounted securely and connections must be mechanically secure.

ENABLING OBJECTIVES:
1. Explain the necessary safety precautions.
2. Describe the wiring methods used for an antenna.
3. Describe the procedure for removing and replacing an antenna.
4. Drill the hole as necessary to fit antenna being used.
5. Remove and replace an antenna.

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MODULE XII

TRIM, ACCESSORIES, AND HARDWARE

MODULE XII - Trim, Accessories, and Hardware

12.1 TASK: Identify fasteners

PERFORMANCE OBJECTIVE: Given a set of illustrations depicting bolts, screws, washers, nuts, speed nuts, and rivets, and their uses, identify and define each type of fastener. The task must be completed with at least 85% correct answers.

ENABLING OBJECTIVES:
1. Identify types of bolts.
2. Identify types of screws.
3. Identify types of washers.
4. Identify types of nuts.
5. Identify types of speed nuts.
6. Identify types of rivets.

12.2 TASK: Remove, replace and align a bumper

PERFORMANCE OBJECTIVE: Given a vehicle and the necessary tools, equipment, and materials, remove and replace a bumper. The bumper assembly must be mounted securely with the specified type, size, and number of fasteners. Distance across and around the face bar must be equal. The face bar, reinforcements, and energy absorbers must not be damaged. The reinforcement must be in alignment with the face bar to manufacturer's specifications. The task must be completed in flat rate time + 50%.

ENABLING OBJECTIVES
1. Explain the necessary safety precautions.
2. Explain the functions of (a) face bar, (b) back bar, (c) energy absorbers, (d) nuts, and (e) impact strips.
3. Describe bumper removal and replacement procedures.
4. Describe bumper alignment and adjustment procedures.
5. Identify types of bumper reinforcements.
6. Describe the procedures for removing, aligning, and replacing a bumper reinforcement.
7. Demonstrate the use of (a) impact wrenches, (b) socket sets, (c) combination wrenches, (d) line-up punches, (e) steel tape.
8. Remove, replace, and align a bumper within flat time rate plus 50%.

12.3 TASK: Remove and replace energy absorbers

PERFORMANCE OBJECTIVE: Given a vehicle with damaged energy absorbers and the necessary tools, equipment, and materials, remove and replace the energy absorbers. The front plate on the absorbers must be in alignment with the reinforcement bar, and the energy absorbers must operate in accordance with manufacturer's specifications. The task must be completed in flat rate time + 50%.

ENABLING OBJECTIVES:
1. Explain the necessary safety precautions.
2. Identify types of energy absorbers.
3. Explain the function and operation of energy absorbers.
4. Describe type of damage that requires replacement of energy absorbers.
5. Describe the procedure for removing, aligning, and replacing energy absorbers.
6. Remove and replace energy absorbers within flat rate time plus 50%.

12.4 TASK: Remove and replace a grille

PERFORMANCE OBJECTIVE: Given a vehicle, service manual, and the necessary tools, equipment, and materials, remove and replace the grille. The grille must be in alignment with adjacent parts and attached securely with the specified type, color, and number of fasteners. No damage to the exterior trim and grille will be caused. The task must be completed in flat rate time + 50%.

ENABLING OBJECTIVES:
1. Explain the necessary safety precautions.
2. Identify grille fasteners.
3. Describe grille removal and replacement procedures.
4. Describe grille alignment and adjustment procedures.
5. Remove and replace a grille within flat rate time plus 50%.

12.5 TASK: Remove and replace a padded dashboard

PERFORMANCE OBJECTIVE: Given a vehicle with a padded dashboard, service manual, and the necessary tools, equipment, and materials, remove and replace a dashboard. The dashboard must be attached securely with the specified type, color, and number of fasteners. The interior trim and seats must not be damaged, and connections must be electrically and mechanically secure.

ENABLING OBJECTIVES:
1. Explain the necessary safety precautions.
2. Identify various dashboard fasteners.
3. Describe the procedure for disconnecting and connecting dashboard electrical circuits.
4. Describe dashboard removal and replacement procedures.
5. Demonstrate the use of specialized hand and power tools.
6. Remove and replace a padded dashboard.

12.6 TASK: Inspect, remove and replace seat and shoulder belts

PERFORMANCE OBJECTIVE: Given a vehicle, service manual, and the necessary tools, equipment, and materials, inspect, remove and replace the seat and shoulder belts. The seat and shoulder belts must connect with mating components and recoil to the static position. The interior trim, seats, and restraint system must not be damaged and the task must be completed in flat rate time + 50%.

ENABLING OBJECTIVES:
1. Explain the necessary safety precautions.
2. Describe the operation of safety belt systems.
3. Describe the procedure for inspecting seat and shoulder belts.
4. Describe the procedure for removing and replacing seat and shoulder belts.
5. Demonstrate the use of seat belt replacement tools.
6. Inspect, remove, and replace damaged seat and shoulder belts.

12.7 TASK: Remove and replace trim panels

PERFORMANCE OBJECTIVE: Given a vehicle, service manual, and the necessary tools, equipment, and materials, remove and replace the trim panels. The water shield and remote mirror control must not be damaged in replacing the door trim panel, and all interior trim must be replaced without damage to the panels or fasteners, push pins, or retainers. Trim panels must be attached securely with the specified type, color, and number of fasteners.

ENABLING OBJECTIVES:
1. Explain the necessary safety precautions.
2. Identify the types of fasteners used for trim panels.
3. Describe the procedures for removing, and installing (a) center pillar, (b) cowl side, (c) door, (d) quarter, (e) roof side, (f) package tray trim panels.
4. Demonstrate the use of door handle tools.
5. Remove and replace trim panels.

12.8 TASK: Remove and replace moldings

PERFORMANCE OBJECTIVE: Given a vehicle, service manual, and the necessary tools, equipment, and materials, remove and replace the moldings. Moldings must be attached securely in the specified locations with the specified type and number of fasteners. The task must be completed in flat rate time + 50%.

ENABLING OBJECTIVES:
1. Explain the necessary safety precautions.
2. Identify fasteners and adhesives used on moldings.
3. Describe the procedures for removing and replacing (a) interior trim garnish, (b) window molding, (c) windshield and rear glass molding, and (d) body exterior molding.
4. Demonstrate the use of molding tools.
5. Remove and replace moldings.

12.9 TASK: Install weatherstripping

PERFORMANCE OBJECTIVE: Given a vehicle with weatherstripping attached, and the necessary tools, equipment, and materials, replace the weatherstripping. Surface preparation must ensure secure bonding. The replaced weatherstripping must not interfere with the opening, closing, or locking of the doors and/or trunk. There must be no air or water leaks, and the task must be completed in flat rate time + 50%.

ENABLING OBJECTIVES:
1. Explain the necessary safety precautions.
2. Identify adhesives and fasteners used for weatherstripping.
3. Describe the installation procedure for adhesive type weatherstripping.
4. Describe the installation and fastening procedure for weatherstripping.
5. Demonstrate the use of fastening tools.
6. Install weatherstripping.

12.10 TASK: Remove, replace, and align door locks and mating parts

PERFORMANCE OBJECTIVE: Given a vehicle, service manual, door lock set, door handle tools, and the necessary tools, equipment, and materials, remove, replace, and align the door locks and mating parts. Door locks must be operational and mate with striker plates. Doors must open and close smoothly and quietly with no damage to the doors or adjacent panels. The task must be completed in flat rate time + 50%.

ENABLING OBJECTIVES:
1. Explain the necessary safety precautions.
2. Explain the operation of door locks and striker plates.
3. Describe the procedure for removing, replacing, and aligning door locks and mating parts.
4. Demonstrate the use of screw and clip removing tools.
5. Remove, replace, and align door locks within flat rate time plus 50%.

12.11 TASK: Remove, replace, and align a trunk lock and mating parts

PERFORMANCE OBJECTIVE: Given a vehicle, service manual, trunk lock set, and the necessary tools, equipment, and materials, remove, replace, and align the trunk lock and its mating parts. The trunk lock must be operational and mate with the striker plate. The trunk must open and close smoothly and quietly, with no damage to adjacent panels. The task must be completed in flat rate time + 50%.

ENABLING OBJECTIVES:
1. Explain the necessary safety precautions.
2. Explain the operation of trunk locks and striker plates.
3. Describe the procedure for removing, replacing, and aligning trunk locks and mating parts to ensure seal.

4. Demonstrate the use of trunk lock tools.
5. Remove, replace, and align a hood latch and mating parts.
6. Inspect and repair/adjust remote control components.

12.12 TASK: Remove, replace, and align a hood latch and mating parts

PERFORMANCE OBJECTIVE: Given a vehicle, hood latch set, and the necessary tools, equipment, and materials, remove, replace and align the hood latch and mating parts. The hood latch must be operational and mate with the striker plate. The hood must open and close smoothly and quietly with no damage to the hood or front end. The task must be completed in flat rate time + 50%.

ENABLING OBJECTIVES:
1. Explain the necessary safety precautions.
2. Explain the operation of latches and striker plates.
3. Describe the procedure for removing, replacing, and aligning hood latches and mating parts.
4. Demonstrate the use of hood latch tools.
5. Remove, replace, and align a hood latch and mating parts.
6. Inspect and repair/adjust remote control components.

12.13 TASK: Remove, replace, and adjust window regulators

PERFORMANCE OBJECTIVE: Given a vehicle with regulator controlled windows, service manual, and the necessary tools, equipment, and materials, remove, replace, and adjust a window regulator. The window regulator must be attached securely to the door with the specified type, size, and number of fasteners. The window must be mounted securely in the regulator channel, and the regulator must be adjusted for proper window pitch. There must be no air or water leaks, and no damage caused to the window or trim. The task must be completed in flat rate time + 50%.

ENABLING OBJECTIVES:
1. Explain the necessary safety precautions.
2. Define pitch.
3. Describe the procedures for replacing manual and power window control units.
4. Describe window regulator removal and replacement procedures.
5. Describe window regulator adjustment procedures.
6. Identify and demonstrate the use of window regulator adjustment tools.
7. Remove, replace, and adjust window regulators.

12.14 TASK: Remove and replace seat tracks

PERFORMANCE OBJECTIVE: Given a vehicle with manually adjustable seats and the necessary tools, equipment, and materials, remove and replace seat tracks. The seat must release, slide, and lock on both tracks simultaneously. The task must be completed in flat rate time + 50%.

ENABLING OBJECTIVES:
1. Explain the necessary safety precautions.
2. Explain the operation of the seat adjustment.
3. Describe the procedure for track removal, replacement and adjustment.
4. Remove and replace seat tracks.

12.15 TASK: Detach and re-glue a vinyl top section

PERFORMANCE OBJECTIVE: Given a vehicle with a vinyl top, heat gun, orbital sander, vinyl adhesive, cleaning solvents, and the necessary tools, equipment, and materials, detach and re-glue the vinyl and padded top section. Surface area must be refinished and free of all foreign matter. Re-glued vinyl must be attached securely and be free of air pockets, wrinkles, and tears. All trim must be mounted securely.

ENABLING OBJECTIVES:
1. Explain the necessary safety precautions.
2. Explain how to detach a vinyl roof section.
3. Identify types of padding used with vinyl tops.
4. Identify (a) cleaning solvents, (b) sandpaper,(c) vinyl adhesives used for vinyl top and padding repair.
5. Describe the procedure for cleaning, sanding, and refinishing the surface before re-gluing a vinyl top section.
6. Describe the procedure for detaching and re-gluing a vinyl top.
7. Describe the procedure for removing wrinkles and air bubbles.
8. Detach a vinyl top section.
9. Re-glue a vinyl top section.

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MODULE XIII

THERMOPLASTIC AND FIBERGLASS REPAIR

MODULE XIII - Thermoplastic and Fiberglass Repair

*** CAUTION ***
Be certain to follow accepted safety procedures when working with plastics

13.1 TASK: Restore or replace a fiberglass panel

PERFORMANCE OBJECTIVE: Given a vehicle with fiberglass panels, matting, resin, respirator, and the necessary tools, equipment, and materials, remove and replace the fiberglass panel. Bonding strips and fiberglassing on the replaced panel joints must ensure secure attachment of the panel. The panel must be free of grooves and indentations and must align with adjacent panels. There must be no damage caused to adjacent panels, and the task must be completed in flat rate time + 50%.

ENABLING OBJECTIVES:
1. Explain the necessary safety precautions.
2. Explain mixing methods for fiberglass resin.
3. Describe the procedure for preparing a surface before applying matting or cloth.
4. Describe the procedure for applying matting or cloth.
5. Describe finishing techniques for fiberglass panels.
6. Demonstrate the use of fiberglass repair tools and equipment.
7. Demonstrate the use of a respirator.
8. Restore a fiberglass panel within flat rate time plus 50%.
9. Replace a fiberglass panel within flat rate time plus 50%.

13.2 TASK: Demonstrate proper airless welding techniques

PERFORMANCE OBJECTIVE: Given a flexible urethane (or similar flexible product) component, rotary die grinder, aluminum tape, cleaning solvents, and an airless welder, prepare urethane, or other flexible plastic component for a weld. The component must be free of contaminants. The repair area must be a beveled edge, creating a vee cut in the face, following the damaged area. Aluminum tape may be applied to be backside of the damaged area while urethane rod is smoothed into the repair. The resulting weld, or repair surface must be brought above level smoothly to allow sanding or grinding to flush, conforming to the original contour. The finished weld should be free of surface defects and ready for sealer, surfacer.

ENABLING OBJECTIVES:

1. Explain the necessary safety precautions
2. Describe the characteristics of thermoplastics.
3. Identify personal safety equipment used in airless welding.
4. Identify types of plastic welds.
5. Explain the plastic filler rod color coding system.
6. Identify plastic filler rods and heat settings for welding thermoplastics.
7. Determine welder speed and filler rod angles in relation to work.
8. Describe the procedure for airless welding.
9. Explain the causes of holes and voids in plastic welds.
10. Weld a urethane or flexible plastic component.

13.3 TASK: Prepare, chemically bond, and finish thermoplastic components

PERFORMANCE OBJECTIVE: Given a plastic component, rotary die grinder, aluminum tape, cleaning solvents, and the necessary tools, equipment, and materials, prepare thermoplastic for a chemical bond. The thermoplastic must be free of dirt, grease, and other foreign matter and have beveled and aligned edges that are completely bonded. The joint must be equal in strength to the original material. The bond must be sanded flush with the original contour and free of holes or voids.

ENABLING OBJECTIVES:
1. Explain the necessary safety precautions.
2. Describe the characteristics of bonding agents.
3. Identify bonding agents for chemically bonding plastics.
4. Describe the procedure for applying bonding agent.
5. Describe the procedure for chemically bonding plastics.
6. Identify types and grades of sandpaper.
7. Explain the applications for sanding blocks and pads.
8. Describe the procedure for finishing the surface of an airless weld.
9. Demonstrate the use of orbital sanders, sanding blocks and pads.
10. Demonstrate the sanding techniques for plastics.
11. Prepare a thermoplastic component for a chemical bond.
12. Chemically bond and finish a thermoplastic component.

13.4 TASK: Correct distortion in a plastic component

PERFORMANCE OBJECTIVE: Given a distorted plastic component, heat source, and the necessary tools, equipment, and materials, correct the distortion in a plastic component. The component must be restored to its original contour and shape with no scorches, burns, or additional damage.

ENABLING OBJECTIVES:

1. Explain the necessary safety precautions.
2. Determine temperature limits for thermoplastics and thermosetting plastics.
3. Describe the procedure for correcting distortion in a plastic component.
4. Describe types of distortions and their causes in plastic components.
5. Demonstrate the use of heat sources.
6. Correct distortion in a plastic component.

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MODULE XIV

GLASS REPLACEMENT

MODULE XIV - Glass Replacement

*** CAUTION ***
Window and windshield glass is a major component of structural integrity.

14.1 TASK: Remove and replace sealed type stationary glass

PERFORMANCE OBJECTIVE: Given a vehicle with sealed type stationary glass, service manual, and the necessary tools, equipment, and materials, remove and replace the stationary glass. The replacement glass must be the specified type and shade and be centered horizontally and vertically. The glass must not leak after installation, and the task must be completed in flat rate time + 50%.

ENABLING OBJECTIVES:
1. Explain the necessary safety precautions.
2. Identify types and shades of glass.
3. Identify sealants used with stationary glass.
4. Explain precautions to avoid cracking or breaking a windshield during removal.
5. Explain the use of spacing blocks.
6. Describe the procedure for centering glass.
7. Describe stationary glass replacement procedures.
8. Describe the procedure for locating and repairing leaks.
9. Demonstrate the use of (a) hot and cold knives, (b) cutting wire, (c) reveal molding clip tool, and other specialty tools.
10. Remove and replace sealed type stationary glass.

14.2 TASK: Remove and replace gasket type stationary glass

PERFORMANCE OBJECTIVE: Given a vehicle with gasket type stationary glass, service manual, replacement glass, gasket, and the necessary tools, equipment, and materials, remove and replace the gasket type stationary glass. The gasket must be positioned and the glass installed so that there are no air or water leaks. The task must be completed in flat rate time + 50%.

ENABLING OBJECTIVES:
1. Explain the necessary safety precautions.
2. Identify gaskets and locks.
3. Describe stationary glass and gasket removal and replacement procedures.
4. Describe the procedure for locating and repairing leaks.

5. Demonstrate the use of (a) lock tools, (b) plastic paddles, and (c) pull cords.
6. Remove and replace gasket type stationary glass.

14.3 TASK: Install a windshield-mounted rearview mirror

PERFORMANCE OBJECTIVE: Given a vehicle, service manual, windshield-mounted rearview mirror, bonding agent, and the necessary tools, equipment, and materials, install a windshield-mounted rearview mirror. The mounting plate must be free of distortions, nicks, and burrs. The windshield must be free of foreign matter, and the mirror must be mounted securely. The mounting plate and windshield must be free of excess glue.

ENABLING OBJECTIVES:
1. Explain the necessary safety precautions.
2. Identify (a) cleaning materials, (b) sanding materials, and (c) bonding agents used to install the mirror.
3. Describe the procedure for installing a windshield mounted rearview mirror.
4. Install a windshield-mounted rearview mirror.

14.4 TASK: Remove and replace regulator-controlled movable glass

PERFORMANCE OBJECTIVE: Given a vehicle with regulator-controlled movable glass, service manual, and the necessary tools, equipment, and materials, remove and replace the regulator-controlled movable glass. The window must be mounted securely in the regulator channel. The channel or roller adjustment must allow the window to raise and lower smoothly. There must be no water leaks or damage to the door hardware and weather stripping. The door trim panel must be attached securely to the door with the specified type, color, and number of fasteners. The task must be completed in flat rate time + 50%.

ENABLING OBJECTIVES:
1. Explain the necessary safety precautions.
2. Explain fastening methods and identify the types of fasteners used to secure glass to regulator.
3. Describe channel and roller removal and replacement procedures.
4. Describe removal and replacement procedures for regulator-controlled movable glass.
5. Select, and demonstrate the use of the fastener installation tool.
6. Remove and replace regulator-controlled movable glass.

14.5 TASK: Remove and replace pivot glass and pivot assembly

PERFORMANCE OBJECTIVE: Given a vehicle equipped with pivot glass, service manual, replacement glass and assembly, and the necessary tools, equipment, and materials, remove and replace the pivot glass and pivot assembly. The pivot glass assembly must open, close, and latch as specified with no air or water leaks. There must be no damage to the door hardware or weather stripping. The task must be completed in flat rate time + 50%.

ENABLING OBJECTIVES:
1. Explain the necessary safety precautions.
2. Explain the three methods by which pivot glass can operate.
3. Explain the method for securing the glass to the pivot assembly.
4. Describe the procedure for replacing pivot glass and pivot assembly.
5. Identify and demonstrate the use of the pivot glass assembly removal tools.
6. Remove and replace pivot glass and pivot assembly.

14.6 TASK: Remove and replace sliding glass

PERFORMANCE OBJECTIVES: Given a vehicle with sliding glass, replacement glass, and the necessary tools, equipment, and materials, remove and replace the sliding glass. The replaced glass must slide freely and mate with latches. There must be no air or water leaks or damage to the track assembly and weather stripping. The task must be completed in flat rate time + 50%.

ENABLING OBJECTIVES:
1. Explain the necessary safety precautions.
2. Identify types of sliding glass.
3. Describe track removal and replacement procedures.
4. Describe sliding glass removal and replacement procedures.
5. Demonstrate the use of track removal tools.
6. Remove and replace sliding glass.

14.7 TASK: Locate and seal leaks around a windshield or rear window

PERFORMANCE OBJECTIVE: Given a vehicle with a leaking seal around the windshield or rear window, sealant, and the necessary tools, equipment, and materials, locate and seal the leaks. There must be no leaks or damage to the seals.

ENABLING OBJECTIVES:

1. Explain the necessary safety precautions.
2. Explain the methods used for locating leaks.
3. Demonstrate reveal molding removal procedures.
4. Identify sealers and explain their uses.
5. Describe the procedure for repairing leaks with sealer.
6. Demonstrate the use of sealant, caulking guns, and caulking compound.

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MODULE XV

PAINTING AND REFINISHING

MODULE XV - Painting and Refinishing

15.1 TASK: Clean surfaces for primer, sealer, and undercoating

PERFORMANCE OBJECTIVE: Given a metal panel, solvents, and the necessary tools, equipment and materials, clean and prepare the metal panel for primer, sealer, and undercoating. Wax, grease, and foreign matter must be completely removed from the surface.

ENABLING OBJECTIVES:
1. Explain the necessary safety precautions.
2. Identify types of solvents and explain their uses.
3. Describe cleaning techniques.
4. Clean and prepare surfaces on a metal panel.

15.2 TASK: Sand metal surfaces for primer, sealer, and undercoating

PERFORMANCE OBJECTIVE: Given a clean metal panel, orbital sander, sanding blocks and pads, particle mask, and the necessary tools, equipment and materials, sand the metal panel for primer, sealer, and undercoating. The metal must be free of paint and rust. The surrounding paint must be featheredged to ensure undercoat bonding with the panel.

ENABLING OBJECTIVES:
1. Explain the necessary safety precautions.
2. Identify sandpaper by type and grade.
3. Identify sanding blocks and pads.
4. Describe the procedure for sanding metal surfaces.
5. Describe the procedure for featheredging a painted metal surface.
6. Demonstrate the use of orbital sanders.
7. Demonstrate the use of manual and power sanding equipment.
8. Sand metal surfaces for primer, sealer, and undercoating.

15.3 TASK: Condition bare metal for primer, sealer, and undercoating

PERFORMANCE OBJECTIVE: Given a bare metal panel or surface, metal conditioner, and the necessary tools, equipment and materials, condition the bare metal for primer, sealer, and undercoating. The panel must be treated with metal conditioner to ensure undercoat bonding with metal.

ENABLING OBJECTIVES:
1. Explain the necessary safety precautions.
2. Identify metal conditioners.
3. Describe metal cleaning techniques.
4. Explain the purpose of metal conditioner.
5. Describe the procedure for applying metal conditioner.
6. Condition bare metal panel for primer, seal and undercoating.

15.4 TASK: Mask sections and parts

PERFORMANCE OBJECTIVE: Given a vehicle or panel requiring masking, a technical manual or masking specifications, masking material, and the necessary tools, equipment and materials, mask all sections and parts.

ENABLING OBJECTIVES:
1. Explain the necessary safety precautions.
2. Explain the use of masking paper and tape dispensers.
3. Describe the procedure for masking vehicles and panels.
4. Demonstrate the use of masking tools.
5. Mask body sections and parts to be painted.

15.5 TASK: Apply undercoats

PERFORMANCE OBJECTIVE: Given a vehicle or prepared panels, spray equipment, undercoating (primer, primer-surfacer, primer-sealer), an assortment of thinners, respirator, and the necessary tools equipment and materials, apply the undercoats. The base material selected must meet requirements for top coat and must be applied smoothly to ensure proper adhesion. The vehicle or panels must have a smooth and uniform finish appearance with no sags or runs.

ENABLING OBJECTIVES:
1. Solve problems involving ratios and proportions.
2. Explain the necessary safety precautions.
3. Identify the types of undercoats.
4. Describe the properties of undercoats.
5. Explain the purpose of undercoating.
6. Identify thinners by grade and uses.
7. Describe surface preparation procedures.
8. Describe the procedure for applying undercoats.
9. Determine mixing ratios for undercoat and additives.
10. Demonstrate the use of spray equipment, rubber squeegees, and paint paddles.
11. Apply undercoats to prepared panels.

15.6 TASK: Match and apply finish coats

PERFORMANCE OBJECTIVE: Given an undercoated vehicle or panel, spray equipment, paint booth, drying room, finish coat, tints, an assortment of thinners, respirator, and the necessary tools, equipment and materials, match and apply the finish coats. Finish coats must match and be applied without sags or runs and must have a smooth and uniform finished appearance.

ENABLING OBJECTIVES:

1. Explain the necessary safety precautions.
2. Name the coats that make up the automotive finish.
3. List the types of finishes found on automobiles today.
4. Describe how to distinguish between a metallic topcoat and a nonmetallic topcoat.
5. Name the three basic ingredients of a topcoat.
6. Describe the procedure used to determine whether a topcoat is lacquer, enamel, or basecoat/clearcoat.
7. Describe the procedure for matching colors.
8. Name the process that refinishers need to know for proper color matching.
9. List three aids for systematic tinting.
10. Describe the causes of poor metallic match.
11. Describe the effects of heat and humidity on paint during storage and application.
12. Explain spray viscosity.
13. Explain the use of activators.
14. Distinguish between two types of paint booths.
15. Name three functions of a drying room.
16. Describe two methods used to force dry paint.
17. Name four items of spray equipment required in every shop.
18. List three conditions that contaminate air compressor lines.
19. Describe how the paint gun works.
20. Describe how to regulate spray patterns.
21. Describe how to trigger a spray gun.
22. Demonstrate the ability to apply finishes.
23. Describe surface preparation procedures.
24. Determine mixing ratios for finish coat and additives.
25. Match finish coat colors with existing color.
26. Apply finish coats to prepared vehicle panels.

15.7 TASK: Determine materials for a paint job

PERFORMANCE OBJECTIVE: Given a vehicle requiring a paint job and paint materials catalogs, determine materials for paint job to include the type and quantity of thinner, solvents, and primer; the type, quantity, and color of paint and paint additives; and the amount of type, tack rags, grease and wax remover, and sandpaper within 15% of predetermined estimate.

ENABLING OBJECTIVES:
1. Identify the type of cleaning solvents to be used to prepare surfaces for repair.
2. Determine the types of sandpapers to be used for the job at hand.
3. Determine the types of primers to be used.
4. Explain the types of thinners, reducers, and additives to be used for primers.
5. Identify the type of paint to be used for a particular job.
6. Explain the use of thinners, reducers, and additives used for the reduction of paint.

15.8 TASK: Clean, compound and polish painted surfaces

PERFORMANCE OBJECTIVE: Given a painted vehicle or panel, and the necessary tools, equipment and materials, clean, compound or polish the painted surfaces to a smooth and glossy appearance free of defects and foreign matters.

ENABLING OBJECTIVES:
1. Explain the necessary safety precautions.
2. Identify compounds used on finish coats.
3. Describe the properties of compound.
4. Describe the techniques for hand rubbing.
5. Describe the techniques for machine polishing.
6. Clean, compound, and polish painted surfaces.

15.9 TASK: Prepare a plastic component for refinishing

PERFORMANCE OBJECTIVE: Given a plastic component requiring refinishing, orbital sander, flex additive, adhesion promoters, primer, sealer, particle mask, respirator, and the necessary tools, equipment and materials, prepare the plastic component of refinishing. The sanded surface must be free of flaws, dust, lint, grease, and wax. The primer and sealer must meet requirements for the top coat, be free of sags and runs, and have a smooth and uniform appearance.

ENABLING OBJECTIVES:

1. Explain the necessary safety precautions.
2. Identify sandpaper by type and grade.
3. Identify primers and sealers.
4. Describe the procedure for applying adhesion promoters, primers and sealers to plastic components.
5. Explain the proper respiratory protection when using any paint additives that contain isocyanates.
6. Demonstrate sanding techniques for plastic components.

15.10 TASK: Refinish plastic components

PERFORMANCE OBJECTIVE: Given a plastic component prepared for refinishing, color coat, flex additive, adhesion promoters, abrasive, spray equipment, respirator, and the necessary tools, equipment and materials, refinish plastic components. The finish must be free of foreign matter, sags, runs, and defects, and must be uniform in color with no paint on adjacent areas.

ENABLING OBJECTIVES:

1. Explain the necessary safety precautions when using flex additives that contain isocyanates.
2. Identify types of color coatings and flex additives.
3. Explain why additives are mixed with color coats and describe effects on the finish coat finish.
4. Describe the procedure for refinishing plastic components.
5. Refinish plastic components.

15.11 TASK: Remove and apply decals and striping

PERFORMANCE OBJECTIVE: Given a vehicle requiring removal or application of decals and striping, and the necessary tools, equipment and materials, remove and apply decals and striping. The striping and decals must be positioned correctly and show no wrinkles, air bubbles, or other imperfections.

ENABLING OBJECTIVES:

1. Explain the necessary safety precautions.
2. Describe surface preparation procedures.
3. Describe the procedure for removing and applying decals.

4. Describe the procedure for removing and applying vinyl striping.
5. Describe the procedure for removing and applying painted striping.
6. Explain the methods for removing air bubbles and wrinkles.
7. Demonstrate the use of squeegees, straight edges, grease pencils, and tape measures.
8. Remove old striping.
9. Remove old decals.
10. Apply decals.
11. Apply striping.

15.12 TASK: Refinish vinyl surfaces (tops, dashes, and interior components)

PERFORMANCE OBJECTIVE: Given a vehicle with a vinyl top, padded dash, and interior panels, spray equipment, paint, tape, respirator, and the necessary tools, equipment and materials, refinish the components. The finish must be free of foreign matter, sags, runs and defects and must be uniform in color and texture. There must be no paint on adjacent areas.

ENABLING OBJECTIVES:
1. Explain the necessary safety precautions.
2. Describe the procedure for masking panels, trim, and glass.
3. Identify types of paint used to refinish vinyl surfaces.
4. Describe the procedure for refinishing a vinyl surfaces.
5. Refinish vinyl surfaces.

MODULE XVI

ESTIMATING

MODULE XVI - Estimating

16.1 TASK: Interpret a cost estimate for a paint job

PERFORMANCE OBJECTIVE: Given a materials list and paint and materials catalogs, interpret a cost estimate for a paint job. The estimate must include individual and total costs for the type and quantity of thinner, solvents, and primer; the type, quantity, and color of paint and paint additives; and the amount of tape, tack rags, grease and wax remover, and sandpaper within 15% of predetermined cost.

ENABLING OBJECTIVES:
1. Determine the unit cost for each material.
2. Describe the procedure for performing a cost estimate.
3. Solve problems requiring addition, subtraction, multiplication and division of decimal numbers.
4. Interpret a cost estimate for a paint job.

16.2 TASK: Complete a parts and materials order form

PERFORMANCE OBJECTIVE: Given a completed estimate, a crash estimating guide, and a blank form for ordering parts, complete the parts and materials order form. All necessary parts must be included, and each part or item must be identified by the correct name and number.

ENABLING OBJECTIVES:
1. Explain how to use part names to locate needed information.
2. Describe the procedure for completing an order form.
3. Complete a parts and materials order form.

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MODULE XVII

DETAILING AND PREPARATION FOR DELIVERY

MODULE XVII - Detailing and Preparation for Delivery

*** CAUTION ***
Extra care should be taken while working around newly painted vehicles.

17.1 TASK: Perform interior detailing

PERFORMANCE OBJECTIVE: Given a vehicle requiring interior detailing and the necessary tools, equipment, and materials, perform interior detailing. The interior must be vacuumed clean, the upholstery must be clean, and the windows must be clean and free of film.

ENABLING OBJECTIVES:
1. Explain safety precautions when working inside a vehicle.
2. Demonstrate vacuuming of carpet and other cloth fabrics.
3. Demonstrate shampooing and/or dry cleaning of carpet and other cloth fabrics.
4. Clean other interior surfaces, head liners, dash, instrument panels, door panels, luggage compartments and vinyl or leather seats.
5. Clean windows and mirrors.

17.2 TASK: Perform exterior clean-up

PERFORMANCE OBJECTIVE: Given a vehicle and the necessary tools, equipment and materials, perform exterior clean-up. All masking materials, dirt, grease, and foreign matter must be removed from the exterior of the vehicle. Windows must be clean and free of film.

ENABLING OBJECTIVES:
1. Explain safety precautions when working on auto exterior.
2. Determine what material and equipment are to be used.
3. Describe the procedures for removal of masking materials and adhesives, over-spray, grease or oil, and other foreign matter.
4. Demonstrate removal of film on windows and chrome or polished surfaces.
5. Demonstrate washing vehicle and chamois dry.
6. Determine if vinyl top, bumper guards and tires are to be restored with appropriate dressing.

17.3 TASK: Perform final inspection for delivery

PERFORMANCE OBJECTIVE: Given a vehicle ready for delivery, and a checklist, perform final inspection. The vehicle must be cleaned on the interior and exterior. All repaired areas must be inspected for finish and work. Radio and other accessories must be in the "off" mode, and the safety features of the vehicle must be operational.

ENABLING OBJECTIVES:

1. Explain the necessary safety precautions.
2. Determine that all repaired areas have been completed by checking original work order.
3. Determine that the vehicle is clean and free from foreign matter and materials.
4. Explain the need to have all accessories in the "off" position and safety features operational.
5. Make sure there is a reasonable amount of fuel in the vehicle and the tire air pressure is correct.

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MODULE XVIII

MISCELLANEOUS TECHNIQUES AND SERVICES

MODULE XVIII - Miscellaneous Techniques and Services

*** CAUTION ***
Be aware of local safety precautions in the handling/disposal of Freon and antifreeze.

18.1 TASK: Identify, inspect, pressure test, and restore the cooling system

PERFORMANCE OBJECTIVES: Given an engine cooling system requiring testing or repair, technical specifications, technical manuals, testing equipment, and the necessary tools, equipment and materials, identify, inspect, or pressure test, and correctly perform the needed repairs.

ENABLING OBJECTIVES:
1. Explain the purpose of the cooling system.
2. Explain the necessary safety precautions.
3. List three functions of the cooling system.
4. Discuss the two methods used to cool internal combustion engines.
5. Name the types of radiator hoses.
6. Explain how the pressure cap works.
7. Explain the operation of the variable speed fan drive.
8. Describe the reasons for using permanent antifreeze solution in the cooling system at all times.
9. Remove and replace a water pump.
10. Remove and replace a radiator.
11. Pressure test a cooling system.
12. Perform service and replacement of a drive belt.
13. Perform antifreeze testing and replace antifreeze solution.

18.2 TASK: Identify, service, purge, test, repair, and charge an automotive air conditioning system

PERFORMANCE OBJECTIVE: Given an automotive air conditioning system requiring testing or repair, technical specifications, technical manuals, testing equipment, refrigerant, and the necessary tools, equipment and materials, identify, service, purge, replace a condenser, evacuate, leak test, and charge it to the specified standards of performance.

ENABLING OBJECTIVES:

1. Explain the necessary safety precautions.
2. Specify on a drawing the high and low sides of a compressor.
3. List the components of the refrigeration system.
4. Describe the purpose of the receiver-dehydrator (dryer).
5. Identify the back seat, mid-position, and front seat of a service valve.
6. Identify the components of a manifold system.
7. Connect the manifold gauge set into the system.
8. Purge the system.
9. Test, repair, or replace a condenser.
10. Evacuate the system using a vacuum pump or charging station.
11. Leak test the system using a leak detector.
12. Repair leaks in the air conditioning system.
13. Charge the system using pound cans.

18.3 TASK: Remove and install an automobile engine and drive train in a safe and efficient manner

PERFORMANCE OBJECTIVE: Given an automobile requiring an engine removal, technical specifications, schematic charts, hoists and jacks, and the necessary tools, equipment and materials, safely remove and install the engine and power train in an organized and efficient manner. The removal must be accomplished without further damage to the auto body or the engine's components. After installation, make all necessary connections and adjustments to prepare the vehicle for delivery.

ENABLING OBJECTIVES:

1. Identify the points at which connections are made in order to safely remove and install the engine and make it ready for delivery.
2. Explain the necessary safety precautions.
3. List the items which must be checked and adjusted before starting a new or rebuilt engine.
4. Describe, in order, the procedures required for engine removal and installation.
5. Select tools and equipment required for engine removal and installation.
6. Describe the removal and installation of a cradle in a unibody automobile.
7. Remove and install engine with automatic transmission.
8. Remove and install engine with standard transmission.